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PN - JP9092066 A 19970404  
 TI - NEUTRAL LINE OPENING-CLOSING SWITCH, AND DISTRIBUTION BOARD PROVIDED WITH IT  
 R - H02B1/10&C; H01H73/06&A; H01H9/00&A  
 PA - MATSUSHITA ELECTRIC WORKS LTD  
 IN - HIRAIWA TATSUAKI; TSUYUMINE OSAMU; HASEGAWA HIROKAZU  
 AP - JP19950247280 19950926  
 PR - JP19950247280 19950926  
 QT - I

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AN - 1997-264780 [24]  
 TI - Opening-closing switch for turning ON or OFF neutral conductor of cable - has ground conductor connection terminal board connected to ground conductor bar inserted in vessel through ground conductor bar piercing portion  
 AS - J09092066 The switch has a neutral conductor bar (20a) inserted to a vessel (30) through a conductor bar piercing portion. A neutral conductor connection terminal board which connects with a load neutral conductor, is accommodated in the vessel. An operation handle (9) is provided with a neutral conductor opening-closing portion which opens and closes between the neutral conductor bar and the neutral conductor connection terminal boards.  
 - A ground conductor bar (20e) is inserted to the vessel through a ground conductor bar piercing portion. A load ground conductor is connected to a ground conductor connection terminal board connected to the ground conductor bar in an open state.  
 - ADVANTAGE - Eliminates clearance between branched breakers. Reduces size of electric power distribution panel by eliminating utilisation of ground terminal. Improves switching operation by preventing removal of ground conductor when measuring insulation resistance of load connected to breaker. Enables simple arrangement of electric power distribution panel.  
 - (Dwg. 1/12)  
 IW - OPEN CLOSE SWITCH TURN NEUTRAL CONDUCTOR CABLE GROUND CONDUCTOR CONNECT TERMINAL BOARD CONNECT GROUND CONDUCTOR BAR INSERT VESSEL THROUGH GROUND CONDUCTOR BAR PIERCE PORTION  
 PN - JP9092066 A 19970404 DW199724 H01H9/00 011pp  
 IC - H01H9/00; H01H73/06; H02B1/32  
 MC - X13-B01 X13-D02A X13-E04  
 DC - X13  
 PA - (MATW) MATSUSHITA ELECTRIC WORKS LTD  
 AP - JP19950247280 19950926  
 PR - JP19950247280 19950926

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PN - JP9092066 A 19970404  
 TI - NEUTRAL LINE OPENING-CLOSING SWITCH, AND DISTRIBUTION BOARD PROVIDED WITH IT  
 AS - PROBLEM TO BE SOLVED: To eliminate wiring a neutral line and an earth wire side lead wire around in a distribution board, and also reduce the dimension of the distribution board.  
 - SOLUTION: This distribution board is provided with a casing body 30 provided with a neutral line bar insertion part into which a neutral line bar 20a is inserted; and a neutral line connecting terminal plate, connected to a neutral line side lead wire for a load to be housed in the casing body 30, and an operation handle 9 equipped with a neutral line opening-closing part for opening-closing part for opening-closing, between the bar 20a and the neutral line connecting terminal plate. In a neutral line opening-closing switch for opening-closing, between the bar 20a and the load, an earth wire bar insertion part, into which an earth wire bar 20e is inserted, is provided on the casing body 30 to connect the earth wire side lead wire of the load, also to provide the earth wire connecting terminal plate, opening-closing-possibly connected to the bar 20e, in the casing body 30.  
 I - H01H9/00; H02B1/32  
 SI - H01H73/06  
 PA - MATSUSHITA ELECTRIC WORKS LTD  
 IN - HIRAIWA TATSUAKI; TSUYUMINE OSAMU; HASEGAWA HIROKAZU  
 ABD - 19970829  
 ASV - 199708  
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## PATENT ABSTRACTS OF JAPAN

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LTD

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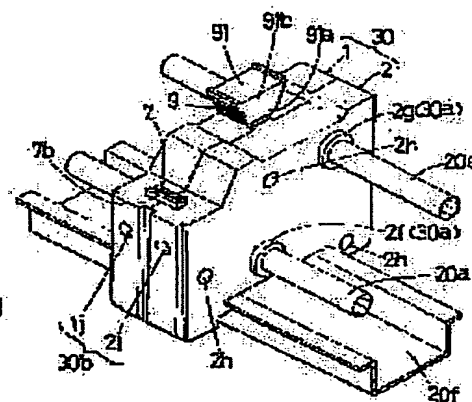
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### (54) NEUTRAL LINE OPENING-CLOSING SWITCH, AND DISTRIBUTION BOARD PROVIDED WITH IT

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To eliminate wiring a neutral line and an earth wire side lead wire around in a distribution board, and also reduce the dimension of the distribution board.

**SOLUTION:** This distribution board is provided with a casing body 30 provided with a neutral line bar insertion part into which a neutral line bar 20a is inserted; and a neutral line connecting terminal plate, connected to a neutral line side lead wire for a load to be housed in the casing body 30, and an operation handle 9 equipped with a neutral line opening-closing part for opening-closing part for opening-closing, between the bar 20a and the neutral line connecting terminal plate. In a neutral line opening-closing switch for opening-closing, between the bar 20a and the load, an earth wire bar insertion part, into which an earth wire bar 20e is inserted, is provided on the casing body 30 to connect the earth wire side lead wire of the load, also to provide the earth wire connecting terminal plate, opening-closing-possibly connected to the bar 20e, in the casing body 30.



#### LEGAL STATUS

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**CLAIMS**

[Claim(s)]

[Claim 1] The vessel body with which the neutral-line bar insertion section which a neutral-line bar inserts in was prepared, and the neutral-line connection terminal assembly which connects with the neutral-line side lead wire of a load, and is held in a vessel body, In the neutral-line open/close switch which is equipped with the actuation handle which prepared the neutral-line closing motion section which opens and closes between a neutral-line bar and neutral-line connection terminal assemblies by being operated, and opens and closes between a neutral-line bar and loads The neutral-line open/close switch characterized by having prepared the grounding conductor bar insertion section which a grounding conductor bar inserts in in said vessel body, and preparing the grounding conductor connection terminal assembly connected to the grounding conductor bar possible [ closing motion ] while the grounding conductor side lead wire of a load was connected in said vessel body.

[Claim 2] Said actuation handle is a neutral-line open/close switch according to claim 1 characterized by preparing the grounding conductor closing motion section which opens and closes between said grounding conductor bar and grounding conductor connection terminal assemblies by being operated.

[Claim 3] Said actuation handle is a neutral-line open/close switch according to claim 1 characterized by preparing the control unit which has the maximum section in which the cross section which intersects perpendicularly with the depth direction while being operated free [ an attitude in the depth direction of said vessel body ] was formed greatly locally.

[Claim 4] Either [ at least ] said neutral-line connection terminal assembly or said grounding conductor connection terminal assembly is the neutral-line open/close switch according to claim 1 characterized by preparing the connection terminal connected with the neutral-line side of said load, or grounding conductor side lead wire by actuation which inserts in the neutral-line side of said load, or grounding conductor side lead wire.

[Claim 5] Said neutral-line bar insertion section and said grounding conductor bar insertion section are a neutral-line open/close switch according to claim 1 characterized by forming identically the area and the configuration of an opening cross section which intersect perpendicularly with the insertion direction.

[Claim 6] Said vessel body is a neutral-line open/close switch according to claim 1 which is an abbreviation rectangular parallelepiped-like and is characterized by forming mutually the fitting means which can fit in in the both sides of the direction of a short hand, respectively.

[Claim 7] It is the neutral-line open/close switch according to claim 1 which said vessel body is an abbreviation rectangular parallelepiped-like, and is characterized by the dimension of the direction of a short hand being abbreviation rectangular parallelepiped-like the dimension and abbreviation identitas of the direction of a short hand which open and close the electrical-potential-difference line side of said load of a breaker.

[Claim 8] Said vessel body is a neutral-line open/close switch according to claim 1 characterized by preparing the lead-wire insertion section which is an abbreviation rectangular parallelepiped-like, and by which the grounding conductor side of said load and neutral-line side lead wire are inserted in the end side of the longitudinal direction in said actuation handle at an other end side, respectively.

[Claim 9] Said vessel body is a neutral-line open/close switch according to claim 1 characterized by having the grounding conductor side case where installed in the neutral-line side case where are an abbreviation rectangular parallelepiped-like and said neutral-line connection terminal assembly was prepared in the interior, and the neutral-line side case, side by side along with the longitudinal direction, and said grounding conductor connection terminal assembly was prepared in the interior.

[Claim 10] The neutral-line open/close switch according to claim 9 characterized by preparing the insulating member into which it divides between said neutral-line side case and said grounding conductor side case.

[Claim 11] The electrical-potential-difference line of single phase 3 line and a neutral-line bar, and the breaker that are installed along with the longitudinal direction of an electrical-potential-difference line bar, and open and close between an electrical-potential-difference line bar and loads, [ two or more ] In the panelboard equipped with the grounding conductor bar installed by the neutral-line bar so that a load might be grounded, and the neutral-line open/close switch according to claim 1. Either [ at least ] the cross section of said neutral-line bar and the opening cross section of said neutral-line bar insertion section, the cross section of said grounding conductor bar or the opening cross section of said grounding conductor bar insertion section is the panelboard characterized by being formed in an approximate circle form.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the neutral-line open/close switch which is arranged in a panelboard and carries out switching operation of the neutral line of a cable run.

[0002]

[Description of the Prior Art] An applicant for this patent is the panelboard X with which install the neutral-line open/close switch X3 and the earth terminal section X4 in the output side of two or more branching breakers X2 installed along with the electrical-potential-difference line bar X1 in JP,4-128014,U as shown in drawing 11 side by side, and it was made for the sum total of the width of face of those neutral-line open/close switches X3 and the earth terminal section X4 to become below the width of face of the branching breaker X2. It has proposed. And this panelboard X When the arranged neutral-line open/close switch X3 is described in detail, this thing vessel body A with which the neutral-line bar insertion section A1 which the neutral-line bar X5 inserts in was formed as shown in drawing 12 It connects with the neutral-line side lead wire of a load, and is a vessel body A. Neutral-line connection terminal assembly B held inside They are the neutral-line bar X5 and the neutral-line connection terminal assembly B by being operated. Actuation handle C which formed the neutral-line closing motion section C1 which opens and closes between It has, and between the neutral-line bar X5 and loads is opened and closed. In detail, with the earth terminal section X4, this thing has an opening for carrying out contiguity arrangement of the grounding conductor bar X6 in parallel with the neutral-line bar X5 between the branching breakers X2, and is prepared.

[0003]

[Problem(s) to be Solved by the Invention] Since contiguity arrangement of the grounding conductor bar X6 is carried out in parallel with the neutral-line bar X5 in the configuration space between the branching breakers X2 while inserting in the neutral-line bar X5 if it is in the above-mentioned neutral-line open/close switch X3, it is Panelboard X about the neutral line of a load, and grounding conductor side lead wire. It is not necessary to take about inside.

[0004] However, since it has an opening for carrying out contiguity arrangement of the grounding conductor bar X6 between the branching breakers X2 and is prepared with the earth terminal section X4 which are another components, this thing is Panelboard X. A dimension will become large.

[0005] This invention is what was made in view of the above-mentioned reason, and the place made into the purpose has it in offering the neutral-line open/close switch which does not need to take about the neutral line and grounding conductor side lead wire in a panelboard, and can make the dimension of a panelboard small.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, a thing according to claim 1 The vessel body with which the neutral-line bar insertion section which a neutral-line bar inserts in was prepared, and the neutral-line connection terminal assembly which connects with the neutral-line side lead wire of a load, and is held in a vessel body, In the neutral-line open/close switch which is equipped with the actuation handle which prepared the neutral-line closing motion section which opens and closes between a neutral-line bar and neutral-line connection terminal assemblies by being operated, and opens and closes between a neutral-line bar and loads The grounding conductor bar insertion section which a grounding conductor bar inserts in is prepared in said vessel body, and while the grounding conductor side lead wire of a load is connected, the grounding conductor connection terminal assembly connected to the grounding conductor bar possible [ closing motion ] is considering as the configuration prepared in said vessel body.

[0007] The thing according to claim 2 is considering said actuation handle as the configuration in which the

grounding conductor closing motion section which opens and closes between said grounding conductor bar and grounding conductor connection terminal assemblies was prepared by being operated in the thing according to claim 1.

[0008] In the thing according to claim 1, the thing according to claim 3 is considering said actuation handle as the configuration in which the control unit which has the maximum section in which the cross section which intersects perpendicularly with the depth direction was formed greatly locally while it is operated free [ an attitude ] in the depth direction of said vessel body.

[0009] The thing according to claim 4 is considering either [ at least ] said neutral-line connection terminal assembly or said grounding conductor connection terminal assembly as the configuration in which the connection terminal connected with the neutral-line side of said load or grounding conductor side lead wire by actuation which inserts in the neutral-line side of said load or grounding conductor side lead wire was prepared in the thing according to claim 1.

[0010] The thing according to claim 5 is considering said neutral-line bar insertion section and said grounding conductor bar insertion section as the configuration in which the area and the configuration of an opening cross section which intersect perpendicularly with the insertion direction were formed identically in the thing according to claim 1.

[0011] In the thing according to claim 1, said vessel body is an abbreviation rectangular parallelepiped-like, and the thing according to claim 6 is considering it as the configuration in which the fitting means which can fit in was mutually formed in the both sides of the direction of a short hand, respectively.

[0012] In a thing according to claim 1, said vessel body of a thing according to claim 7 is an abbreviation rectangular parallelepiped-like, and the dimension of the direction of a short hand is considered as the configuration which is abbreviation rectangular parallelepiped-like the dimension and abbreviation identities of the direction of a short hand which open and close the electrical-potential-difference line side of said load of a breaker.

[0013] In the thing according to claim 1, said vessel body is an abbreviation rectangular parallelepiped-like, and the thing according to claim 8 is considering it as the configuration which prepared the lead-wire insertion section by which the grounding conductor side of said load and neutral-line side lead wire are inserted in the end side of the longitudinal direction in said actuation handle at an other end side, respectively.

[0014] In the thing according to claim 1, said vessel body is an abbreviation rectangular parallelepiped-like, and the thing according to claim 9 is considering it as the configuration with the grounding conductor side case where installed in the neutral-line side case where said neutral-line connection terminal assembly was prepared in the interior, and the neutral-line side case, side by side along with the longitudinal direction, and said grounding conductor connection terminal assembly was prepared in the interior.

[0015] The thing according to claim 10 is taken as the configuration in which the insulating member into which it divides between said neutral-line side case and said grounding conductor side case was prepared in the thing according to claim 9.

[0016] The breaker which two or more things according to claim 11 are installed along with the longitudinal direction of the electrical-potential-difference line of single phase 3 line and a neutral-line bar, and an electrical-potential-difference line bar, and opens and closes between an electrical-potential-difference line bar and loads, In the panelboard equipped with the grounding conductor bar installed by the neutral-line bar so that a load might be grounded, and the neutral-line open/close switch according to claim 1 Either [ at least ] the cross section of said neutral-line bar and the opening cross section of said neutral-line bar insertion section, the cross section of said grounding conductor bar or the opening cross section of said grounding conductor bar insertion section is considering as the configuration formed in the approximate circle form.

[0017]

[Embodiment of the Invention] One operation gestalt of this invention is explained below based on drawing 1 thru/or drawing 10. This neutral-line open/close switch 10 is neutral-line bar 20a of a panelboard 20, as shown in drawing 2. Between loads (not shown) is opened and closed. In detail, it is neutral-line bar 20a. Chief editor breaker 20b for single phase 3 lines which is a cross-section approximate circle form and was arranged by the panelboard 20 Both electrical-potential-differences line bars 20c and 20c It connects. A load is electrical-potential-difference line bar 20c. Branching breaker 20d of the shape of an abbreviation rectangular parallelepiped installed along with the longitudinal direction Electrical-potential-difference line bar 20c Between is opened and closed. [ two or more ] Moreover, grounding conductor bar 20e of a cross-section approximate circle form which grounds a load to this panelboard 20 Neutral-line bar 20a Contiguity

arrangement is carried out in parallel.

[0018] further -- detailed -- this neutral-line open/close switch 10 -- the neutral-line side case 1, the grounding conductor side case 2, the neutral-line connection terminal assembly 3, the grounding conductor connection terminal assembly 4, a spring 5, the connection terminal 6, a release button 7, an insulating member 8, and actuation handle 9 from -- it is constituted.

[0019] Neutral-line side case 1 It is formed in the core box of the shape of an abbreviation rectangular parallelepiped in which has a side attachment wall around bottom plate 1a, and the profile whole surface carried out opening, for example by insulating material like phenol resin, and is the grounding conductor side case 2. A vessel body 30 is formed. Neutral-line side case 1 As opening 1b for actuation handles cuts to the end side of a longitudinal direction, opening 1c for release buttons cuts from an opening end face to an other end side and it lacks on the side attachment wall located up when arranged by the panelboard 20, it is formed in it, respectively. In consideration of the arrangement of the member which it is not thick and a wall side holds with the uniform side attachment wall around bottom plate 1a, immobilization, positioning, etc., an outer wall side is suitably designed in consideration of the arrangement to a panelboard 20 etc.

[0020] This neutral-line side case 1 In bottom plate 1a, it is neutral-line bar 20a of a panelboard 20. And grounding conductor bar 20e 1d of neutral-line bar insertion sections and grounding conductor bar insertion section 1e which are inserted in, respectively are drilled. The area and the configuration of an opening cross section which an opening cross section is an approximate circle form, and intersect perpendicularly with the insertion direction are formed identically, and each of 1d of these neutral-line bar insertion sections and grounding conductor bar insertion section 1e is Steps 1f and 1g, respectively. It is formed and the opening cross section by the side of the direction of outside is larger than the opening cross section by the side of the direction of inner. Moreover, in bottom plate 1a, it is the grounding conductor side case 2. 1h of holes for the caulking pins for immobilization (not shown) is prepared. This neutral-line side case 1 Neutral-line side lead-wire insertion hole 1j which inserts the neutral-line side lead wire (not shown) of a load in the side attachment wall by the side of the other end of a longitudinal direction is drilled. Moreover, this neutral-line side case 1 In bottom plate 1a, it is the actuation handle 9. Sliding slot 1k which supports the sliding projection 94 mentioned later free [ sliding ] is prepared.

[0021] Grounding conductor side case 2 Neutral-line side case 1 It is formed in the core box of the shape of an abbreviation rectangular parallelepiped in which has a side attachment wall around bottom plate 2a, and the profile whole surface carried out opening similarly. grounding conductor side case 2 the side attachment wall located up when arranged by the panelboard 20 -- the end side of a longitudinal direction -- neutral-line side case 1 the notching width of face of opening 1b for actuation handles, and abbreviation -- piece 2b of a protrusion with equivalent width of face is prepared. This piece 2b of a protrusion is the grounding conductor side case 2. Neutral-line side case 1 When a vessel body 30 is formed, it engages with opening 1b for actuation handles, and it is the actuation handle 9. The insertion hole to insert in is formed. Moreover, grounding conductor side case 2 From the opening end face, it cuts, and as opening 2c for release buttons lacks, it is prepared in the other end side of the longitudinal direction of the side attachment wall with which piece 2b of a protrusion was prepared. Like bottom plate 1a of the neutral-line side case 1, the side attachment wall around bottom plate 2a is designed suitably, and has been no longer uniform thickness.

[0022] This grounding conductor side case 2 In bottom plate 2a, it is neutral-line bar 20a of a panelboard 20. And grounding conductor bar 20e 2d of neutral-line bar insertion sections and grounding conductor bar insertion section 2e which are inserted in, respectively are drilled. The area and the configuration of an opening cross section which an opening cross section is an approximate circle form, and intersect perpendicularly with the insertion direction are formed identically, and each of 2d of these neutral-line bar insertion sections and grounding conductor bar insertion section 2e is the neutral-line side case 1 to the opening edge by the side of the direction of outside. Steps 1f and 1g It is fitting means 30a which can fit in mutually. Rests 2f and 2g to constitute It is formed, respectively. This fitting means 30a It is the neutral-line side case 1 so that it may mention later. And grounding conductor side case 2 It comes to be located in the both sides of the direction of a short hand of that vessel body 30, when it installs along with a longitudinal direction and a vessel body 30 is formed. Moreover, 2h of holes for caulking pins (not shown) is prepared in bottom plate 2a. This neutral-line side case 1 Grounding conductor side lead-wire insertion hole 2j which inserts the grounding conductor side lead wire (not shown) of a load in the side attachment wall by the side of the other end of a longitudinal direction is drilled. This grounding conductor side lead-wire insertion hole 2j is the neutral-line side case 1. It is lead-wire insertion section 30b in neutral-line side lead-wire insertion hole 1j. It constitutes. This lead-wire



insertion section 30b It is the neutral-line side case 1 so that it may mention later. And grounding conductor side case 2 It comes to be located in the other end side of the longitudinal direction of that vessel body 30, when it installs along with a longitudinal direction and a vessel body 30 is formed. Moreover, this grounding conductor side case 2 In bottom plate 2a, it is the actuation handle 9. Sliding slot 2k which supports the sliding projection 95 mentioned later free [ sliding ] is prepared.

[0023] and the above-mentioned neutral-line side case 1 And grounding conductor side case 2 a longitudinal direction -- meeting -- installing -- holes 1h and 2h for each caulking pins a caulking pin -- letting it pass -- the abbreviation rectangular parallelepiped-like vessel body 30 is constituted by being closed. the dimension of the direction of a short hand of this vessel body 30 -- abbreviation rectangular parallelepiped-like branching breaker 20d the dimension of the direction of a short hand, and abbreviation -- it is the same thing.

[0024] neutral-line connection terminal assembly 3 1st and 2nd connection terminal assemblies 31 and 32 from -- it becomes. On the other hand, the 1st connection terminal assembly 31 is piece 31a by the electric conduction metallic material. And piece of another side 31b It is formed in the shape of [ which it had ] abbreviation for L characters. On the other hand, it is piece 31a. It is neutral-line contact 31c to the point. In the center of abbreviation, it is piece of another side 31b again. 31d of connection terminal arrangement sections installed to hard flow In the end face section, it is a spring 5 again. Spring specification-part 31e which contacts and carries out location regulation It is prepared, respectively. In detail, it is 31d of connection terminal arrangement sections. Both opposite sections 31f and 31g It is formed in the cross-section abbreviation KO character type which it had.

[0025] The 2nd connection terminal assembly 32 is central piece 32a by the electric conduction metallic material. And pieces 32b and 32c of both opposite It has and is formed in the abbreviation KO character type. This central piece 32a It is a spring 5 to that direction of inner. 32d of spring specification parts of the protrusion configuration which contacts and carries out location regulation It is prepared. on the other hand -- piece of opposite 32b the point -- piece of another side opposite 32c from -- it bends at a right angle in the direction keeping away -- having -- neutral-line contact 31c of the 1st connection terminal assembly 31 Neutral-line contact attachment-and-detachment section 32e attaching and detaching It is formed. piece of another side opposite 32c the point -- on the other hand -- piece of opposite 32b from -- the condition of it having been bent by the right angle in the direction keeping away, and having been arranged in the vessel body 30 -- the neutral-line bar insertion sections 1d and 2d of a vessel body 30 Inserted-in neutral-line bar 20a 32f of neutral-line bar attachment-and-detachment sections attaching and detaching is formed. In addition, neutral-line contact attachment-and-detachment section 32e Neutral-line contact 31c Attachment-and-detachment actuation and 32f of neutral-line bar attachment-and-detachment sections Neutral-line bar 20a About attachment-and-detachment actuation, it mentions later in detail.

[0026] grounding conductor connection terminal assembly 4 Neutral-line connection terminal assembly 3 the same -- 1st and 2nd connection terminal assemblies 41 and 42 from -- it becomes. The 1st connection terminal assembly 41 is the neutral-line connection terminal assembly 3. On the other hand, it is piece 41a like the 1st connection terminal assembly 31. And piece of another side 41b It is formed in the shape of [ which it had ] abbreviation for L characters. On the other hand, it is piece 41a. It is piece of another side 41b to the center of abbreviation. Connection terminal arrangement section 41c installed to hard flow It is prepared. In detail, it is connection terminal arrangement section 41c. Both opposite sections 41d and 41e It is formed in the cross-section abbreviation KO character type which it had. Piece of another side 41b It is 41f of grounding conductor contacts to the point. It is prepared.

[0027] The 2nd connection terminal assembly 42 is the neutral-line connection terminal assembly 3. It is central piece 42a like the 2nd connection terminal assembly 32. And pieces 42b and 42c of both opposite It has and is formed in the abbreviation KO character type. This central piece 42a Neutral-line connection terminal assembly 3 It is a spring 5 to a direction like the 2nd connection terminal assembly 32. 42d of spring specification parts of the protrusion configuration which contacts and carries out location regulation It is prepared. on the other hand -- piece of opposite 42b the point -- piece of another side opposite 42c from -- it bends at a right angle in the direction keeping away -- having -- 41f of grounding conductor contacts of the 1st connection terminal assembly 41 Grounding conductor contact attachment-and-detachment section 42e attaching and detaching It is formed. piece of another side opposite 42c the point -- on the other hand -- piece of opposite 42b from -- the condition of it having been bent by the right angle in the direction keeping away, and having been arranged in the vessel body 30 -- the grounding conductor bar insertion sections 1e and 2e of a vessel body 30 Inserted-in grounding conductor bar 20e 42f of grounding conductor bar attachment-and-

detachment sections attaching and detaching It is formed. In addition, grounding conductor contact attachment-and-detachment section 42e 41f of grounding conductor contacts Attachment-and-detachment actuation and 42f of grounding conductor bar attachment-and-detachment sections Grounding conductor bar 20e About attachment-and-detachment actuation, it mentions later in detail.

[0028] Connection terminal 6 Neutral-line connection terminal assembly 3 formed in the cross-section abbreviation KO character type, respectively as it has spring nature, was formed in the shape of abbreviation for S characters and having been mentioned above with the electric conduction metallic material 31d of connection terminal arrangement sections Or grounding conductor connection terminal assembly 4 Connection terminal arrangement section 41c It is arranged. The neutral-line side lead wire of a load is lead-wire insertion section 30b of a vessel body 30. It passes along neutral-line side lead-wire insertion hole 1j which constitutes one, and is 31d of connection terminal arrangement sections. On the other hand, it is 31f of opposite sections. Connection terminal 6 By actuation inserted in among both ends Connection terminal 6 It is 31d of connection terminal arrangement sections by both ends. On the other hand, it is 31f of opposite sections. Escaping is locked while being pressed. Moreover, grounding conductor side lead wire is lead-wire insertion section 30b of a vessel body 30 similarly. It passes along grounding conductor side lead-wire insertion hole 2j which constitutes one, and is connection terminal arrangement section 41c. On the other hand, they are the opposite section and the connection terminal 6. By actuation inserted in among both ends Connection terminal 6 It is connection terminal arrangement section 41c by both ends. On the other hand, it is 41d of opposite sections. Escaping is regulated by \*\* locked as the end section 6a is also while being pressed.

[0029] Release button 7 It consists of two press sections 7c installed from the another side side of control unit 7b of substrate 7a and substrate 7a installed from the field on the other hand, and substrate 7a. This release button 7 That control unit 7b is the neutral-line side case 1. And grounding conductor side case 2 Openings 1c and 2c for release buttons It inserts in free [ an attitude ]. Neutral-line connection terminal assembly 3 31d of connection terminal arrangement sections Or grounding conductor connection terminal assembly 4 Connection terminal arrangement section 41c Connection terminal 6 arranged, respectively It is equipped with end section 6a in the condition which can press two press sections 7c. Connection terminal 6 It is 31d of connection terminal arrangement sections by both ends. And connection terminal arrangement section 41c On the other hand, each is the opposite sections 31f and 41d. The neutral-line side lead wire which had it locked to escape while being pressed, and grounding conductor side lead wire are this release button 7. It pushes in and is the connection terminal 6. It can extract by pressing end section 6a and canceling locking.

[0030] Insulating member 8 Neutral-line side case 1 Grounding conductor side case 2 Between is divided and it consists of an insulating ingredient. This insulating member 8 Neutral-line bar 20a Neutral-line insertion hole 8a to insert in and grounding conductor bar 20e In order to secure the space which arranges grounding conductor bar insertion notching 8b to insert in and the actuation handle 9, 8d of insertion holes which notching 8 for actuation handles c cut and lacked and a caulking pin insert in is prepared, respectively.

[0031] Actuation handle 9 It is formed in the shape of a profile square bar, and the control unit 91 for operating it free [ an attitude ] in the depth direction of a vessel body is formed in the end section of shaft orientations. In detail, the cross section which intersects perpendicularly with the depth direction becomes large gradually, and this control unit 91 is minimum section 91a with the smallest cross section. Maximum section 91b which compared and was formed greatly locally It has in the point. This actuation handle 9 When that other end is formed in two forks and arranged, it is the neutral-line side case 1. The one side located inside is neutral-line bar 20a. It is the neutral-line closing motion section 92 which opens and closes between the neutral-line connection terminal assemblies 3, and is the grounding conductor side case 2. The other side located inside is grounding conductor bar 20e. Grounding conductor connection terminal assembly 4 It is the grounding conductor closing motion section 93 which opens and closes between. These neutral-line closing motion sections 92 and the grounding conductor closing motion section 93 are all Ramps 92a and 93a. It is formed, and width of face is narrow, so that it goes approach [ the end section ]. Moreover, this actuation handle 9 In case it is operated free [ an attitude in the depth direction of a vessel body 30 ], it is the neutral-line side case 1. Bottom plate 1a and grounding conductor side case 2 Each sliding slot 1k and 2k of bottom plate 2a Sliding projections 94 and 95 supported free [ sliding ] It is prepared in the both sides of a center section, respectively. And this actuation handle 9 Neutral-line side case 1. Opening 1 for actuation handles b, and grounding conductor side case 2 It is in the condition inserted in the insertion hole of the vessel body 30 formed of piece 2b of a protrusion, and is arranged in the end side of the longitudinal direction of a vessel body 30.

[0032] Next, the arrangement condition in the panelboard 20 of this neutral-line open/close switch 10 is

explained. This neutral-line open/close switch 10 is fitting means 30a of the adjoining things. Frame 20f which is in the condition which had and fitted in mutually, and was prepared in the panelboard 20 Branching breaker 20d which corresponds to drawing 2 and drawing 10 so that it may be installed upwards and may be shown The point of a longitudinal direction is arranged in the condition of countering mutually.

[0033] Next, drawing 7 (a) And (b) It is based and is the actuation handle 9. Neutral-line bar 20a by actuation Neutral-line connection terminal assembly 3 which consists of the 1st and 2nd connection terminal assemblies 31 and 32 The switching condition of a between is explained. Actuation handle 9 In the condition of having been pushed in in the depth direction, it is this drawing (a). It is neutral-line bar 20a so that it may be shown. 32f of neutral-line bar attachment-and-detachment sections of the 2nd connection terminal assembly 32 It contacts and is neutral-line contact 31c of the 1st connection terminal assembly 31. Neutral-line contact attachment-and-detachment section 32e of the 2nd connection terminal assembly 32 It has contacted. And actuation handle 9 If a control unit 91 is held and it pulls to hard flow with the depth direction Ramp 92a of the neutral-line closing motion section 92 Central piece 32a of the 2nd connection terminal assembly 32 It contacts. Central piece 32a If it presses gradually in the compression direction of a spring 5, it is neutral-line bar 20a. 32f of neutral-line bar attachment-and-detachment sections of the 2nd connection terminal assembly 32 While opening gradually Neutral-line contact 31c of the 1st connection terminal assembly 31 Neutral-line contact attachment-and-detachment section 32e of the 2nd connection terminal assembly 32 It opens gradually. And when hauling actuation is completed, it is this drawing (b). So that it may be shown The broad point of the neutral-line closing motion section 92 is central piece 32a of the 2nd connection terminal assembly 32. It presses. Neutral-line bar 20a 32f of neutral-line bar attachment-and-detachment sections of the 2nd connection terminal assembly 32 Predetermined spacing is had and opened. Moreover, neutral-line contact 31c of the 1st connection terminal assembly 31 Neutral-line contact attachment-and-detachment section 32e of the 2nd connection terminal assembly 32 Since predetermined spacing is had and opened, it is neutral-line bar 20a. Neutral-line connection terminal assembly 3 Between will open.

[0034] Next, drawing 8 (a) And (b) It is based and is the actuation handle 9. Grounding conductor bar 20e by actuation Grounding conductor connection terminal assembly 4 which consists of the 1st and 2nd connection terminal assemblies 41 and 42 The switching condition of a between is explained. Actuation handle 9 In the condition of having been pushed in in the depth direction, it is this drawing (a). It is grounding conductor bar 20e so that it may be shown. 42f of grounding conductor bar attachment-and-detachment sections of the 2nd connection terminal assembly 42 It contacts and is 41f of grounding conductor contacts of the 1st connection terminal assembly 41. Grounding conductor contact attachment-and-detachment section 42e of the 2nd connection terminal assembly 42 It has contacted. And actuation handle 9 If a control unit 91 is held and it pulls to hard flow with the depth direction Ramp 93a of the grounding conductor closing motion section 93 Central piece 42a of the 2nd connection terminal assembly 42 It contacts. Central piece 42a If it presses gradually in the compression direction of a spring 5, it is grounding conductor bar 20e. 42f of grounding conductor bar attachment-and-detachment sections of the 2nd connection terminal assembly 42 While opening gradually 41f of grounding conductor contacts of the 1st connection terminal assembly 41 Grounding conductor contact attachment-and-detachment section 42e of the 2nd connection terminal assembly 42 It opens gradually. And when hauling actuation is completed, it is this drawing (b). So that it may be shown The broad point of the grounding conductor closing motion section 93 is central piece 42a of the 2nd connection terminal assembly 42. It presses. Grounding conductor bar 20e 42f of grounding conductor bar attachment-and-detachment sections of the 2nd connection terminal assembly 42 Predetermined spacing is had and opened. 41f of moreover, grounding conductor contacts of the 1st connection terminal assembly 41 Grounding conductor contact attachment-and-detachment section 42e of the 2nd connection terminal assembly 42 Since predetermined spacing is had and opened, it is grounding conductor bar 20e. Grounding conductor connection terminal assembly 4 Between will open. As mentioned above in this condition, it is neutral-line bar 20a. Neutral-line connection terminal assembly 3 Since between is open, it is the actuation handle 9. By one-time actuation, it is neutral-line bar 20a. Neutral-line connection terminal assembly 3 Between and grounding conductor bar 20e Grounding conductor connection terminal assembly 4 It means that between had opened to coincidence.

[0035] The grounding conductor bar insertion sections 1e and 2e which do not need to take about the neutral line and grounding conductor side lead wire in a panelboard 20, have become, and were prepared in the vessel body 30 if it was in this neutral-line open/close switch 10 Grounding conductor bar 20e By inserting in While not preparing an opening between breakers, and becoming like the conventional example and connecting the

grounding conductor side lead wire of a load, it is grounding conductor bar 20e. Grounding conductor connection terminal assembly 4 connected possible [ closing motion ] By being prepared in a vessel body 30 Since it becomes unnecessary to prepare the earth terminal section independently, the dimension of a panelboard 20 can be made small.

[0036] moreover, one-time actuation -- actuation handle 9 The neutral line and the grounding conductor closing motion sections 92 and 93 the neutral line or a grounding conductor -- respectively -- it can open and close -- branching breaker 20d and a case so that the insulation resistance of the load connected to the neutral-line open/close switch 10 may be measured -- terminal assembly 4 for grounding conductor connection from -- it becomes unnecessary to remove grounding conductor side lead wire, and workability can be improved.

[0037] Moreover, actuation handle 9 Maximum section 91b in which the cross section which intersects perpendicularly with the depth direction was locally formed greatly when operated free [ an attitude in the depth direction ] Since the control unit 91 which it has can be held and operated, operability is good.

[0038] Moreover, neutral-line connection terminal assembly 3 Or grounding conductor connection terminal assembly 4 Connection terminal 6 prepared, respectively Since it connects with the neutral-line side of a load, or grounding conductor side lead wire by actuation which inserts in the neutral-line side of a load, and grounding conductor side lead wire, can \*\*\*\* for connection, it becomes unnecessary to do a stop activity, and workability can be raised.

[0039] Moreover, the neutral-line bar insertion sections 1d and 2d And the grounding conductor bar insertion sections 1e and 2e By forming identically the area and the configuration of an opening cross section which intersect perpendicularly with the insertion direction Neutral-line bar insertion sections 1d and 2d Grounding conductor bar 20e Grounding conductor bar insertion sections 1e and 2e Neutral-line bar 20a Since what inserts in, respectively becomes possible, the degree of freedom of the arrangement gestalt to a panelboard 20 can be made high.

[0040] Moreover, the vessel body 30 which adjoins in the condition of having been arranged in the panelboard 20 is fitting means 30a prepared in the both sides of the direction of a short hand. Since fitting becomes possible mutually, what an arrangement condition becomes firm and is shaky is lost.

[0041] Moreover, branching breaker 20d which opens and closes the electrical-potential-difference line side of a load By having the dimension of the direction of a short hand, and the dimension of the direction of a short hand which is abbreviation identitas, it is branching breaker 20d. It can arrange in a panelboard 20 so that it may correspond to one to one, and the handling nature after arrangement can be improved.

[0042] Moreover, actuation handle 9 While preparing in the end side of the longitudinal direction of a vessel body 30 Lead-wire insertion section 30b in which the grounding conductor side of a load and neutral-line side lead wire are inserted By preparing in the other end collectively The lead-wire insertion section and the actuation handle 9 in which either [ at least ] a grounding conductor side or neutral-line side lead wire is inserted It can prepare in either of the both ends collectively, and on the whole, a vessel body 30 can be miniaturized rather than the periphery of the actuation handle 9 takes a big tooth space locally.

[0043] Moreover, neutral-line connection terminal assembly 3 Neutral-line side case 1 prepared in the interior And grounding conductor connection terminal assembly 4 Grounding conductor side case 2 prepared in the interior After assembling separately, the workability of an assembly can be made high by installing along with a longitudinal direction rather than it assembles one component at a time.

[0044] Moreover, insulating member 8 Neutral-line side case 1 Grounding conductor side case 2 By dividing between, it becomes unnecessary to prepare insulating space independently, and a vessel body 30 can be miniaturized.

[0045] If it is in the panelboard 20 equipped with this neutral-line open/close switch 10, it is neutral-line bar 20a. And grounding conductor bar 20e It is neutral-line bar 20a, without occupancy space's being able to lessen and enlarging a panelboard 20 rather than the thing of a cross-section rectangle with the equal cross section, since each is formed in the cross-section approximate circle form. Grounding conductor bar 20e The insulating space of a between is securable.

[0046] In addition, at this operation gestalt, it is the actuation handle 9. It is grounding conductor bar 20e by being operated. Grounding conductor connection terminal assembly 4 Although the grounding conductor closing motion section 93 which opens and closes between is formed For example, branching breaker 20d And when not measuring so much insulation resistance of the load connected to the neutral-line open/close switch 10 The handle which has the grounding conductor closing motion section and is operated separately [ the actuation handle 9 ] is prepared. It is the grounding conductor connection terminal assembly 4 by actuation of

the handle. You may make it open and close between and it is the actuation handle 9 then. Since only the neutral-line closing-motion section 92 will be formed, a configuration becomes simpler, and it is the actuation handle 9. It becomes easier to do processing.

[0047] Moreover, at this operation gestalt, it is the actuation handle 9. Maximum section 91b in which the cross section which intersects perpendicularly with the depth direction while being operated free [ an attitude in the depth direction of a vessel body 30 ] was formed greatly locally. Although the control unit 91 which it has is formed. For example, you may be formed so that the area of the cross section which intersects perpendicularly with the depth direction may become homogeneity, when a skid etc. is formed in an operating part, and it is the actuation handle 9 then. A configuration becomes simpler and it becomes easier to do processing.

[0048] Moreover, at this operation gestalt, it is the actuation handle 9. Although the cross section where the depth direction and a control unit 91 cross at right angles is becoming large gradually, only a specific part can do the same effectiveness so locally, even if a cross section is formed greatly.

[0049] Moreover, at this operation gestalt, it is the neutral-line connection terminal assembly 3. And grounding conductor connection terminal assembly 4. Connection terminal 6 connected with the neutral-line side of a load, or grounding conductor side lead wire by actuation which inserts in the neutral-line side of a load, or grounding conductor side lead wire. Although prepared. For example, it is the connection terminal 6 in order to make magnitude of a vessel body 30 small. When not providing the tooth space to arrange. You may make it the configuration connected by a screw-thread stop etc. then neutral-line connection terminal assembly 3. The opposite sections 31f and 31g. 31d of connection terminal arrangement sections which it had. Moreover, grounding conductor connection terminal assembly 4. Opposite sections 41d and 41e. Connection terminal arrangement section 41c which it had. Since it becomes unnecessary to prepare, it is the neutral-line connection terminal assembly 3. And grounding conductor connection terminal assembly 4. A configuration becomes simpler and it becomes easier to do processing.

[0050] Moreover, at this operation gestalt, it is the neutral-line connection terminal assembly 3. And grounding conductor connection terminal assembly 4. It is all the connection terminal 6. Although prepared, only either is the connection terminal 6. It may be prepared and is the connection terminal 6 then. The configuration of a connection terminal assembly which is not established becomes simpler, and it becomes easier to do processing.

[0051] Moreover, at this operation gestalt, they are the neutral-line bar insertion sections 1d and 2d. And although the area and the configuration of an opening cross section which intersect perpendicularly with the insertion direction are formed identically, the grounding conductor bar insertion sections 1e and 2e. For example, the arrangement gestalt to a panelboard 20 -- becoming settled -- \*\*\*\* -- the neutral-line bar insertion sections 1d and 2d. Grounding conductor bar 20e. Grounding conductor bar insertion sections 1e and 2e. Neutral-line bar 20a. When not inserting in, respectively, it may be formed in a different area or a different configuration, and the degree of freedom of a design of neutral-line open/close switch 10 the very thing can be then enlarged.

[0052] Moreover, at this operation gestalt, it is fitting means 30a which can fit in mutually on both sides of the direction of a short hand of a vessel body 30. Although prepared, respectively. For example, when the fixture for carrying out firm [ of the arrangement condition ] is prepared in the panelboard 20, it is fitting means 30a. It is the neutral-line side case 1 which does not need to be established and constitutes a vessel body 30 then. And grounding conductor side case 2. A configuration becomes simpler and it becomes easy to do processing.

[0053] moreover -- this operation gestalt -- the dimension of the direction of a short hand of a vessel body 30 -- branching breaker 20d the dimension of the direction of a short hand, and abbreviation -- although it is the same -- branching breaker 20d since it is large -- this branching breaker 20d. If it doubles with a dimension, when the dimension of a vessel body 30 becomes large, a different dimension is sufficient, and the degree of freedom of a dimension design of a vessel body 30 can be then enlarged.

[0054] Moreover, at this operation gestalt, it is the actuation handle 9 to the end side of the longitudinal direction of a vessel body 30. Lead-wire insertion section 30b by which the grounding conductor side of a load and neutral-line side lead wire are inserted in an other end side. Although prepared, respectively. For example, actuation handle 9. It is the lead-wire insertion section and the actuation handle 9 in which either [ at least ] a grounding conductor side or neutral-line side lead wire is inserted when magnitude is small. You may prepare in either of the both ends collectively, and the degree of freedom of a design can be then enlarged.

[0055] Moreover, at this operation gestalt, it is the neutral-line connection terminal assembly 3. Neutral-line side case 1 prepared in the interior. And the neutral-line side case 1. Grounding conductor side case 2 where

installed along with the longitudinal direction and the grounding conductor connection terminal assembly 4 was formed in the interior. Although it is made the configuration which it had. For example, when it seems that it is [ which was made into the assembly line ] more convenient to assemble and to assemble one component at a time for production control of Rhine, it is not necessary to make it such a configuration, and then, as a case and covering are manufactured, the degree of freedom of a design can be enlarged.

[0056] Moreover, at this operation gestalt, it is the neutral-line side case 1. Grounding conductor side case 2. Insulating member 8 into which between is divided. When a vessel body 30 is small formed, for example even if it prepared insulating space independently although prepared, it is an insulating member 8. It does not need to be prepared and components mark can be then lessened.

[0057] Moreover, with this operation gestalt, although the vessel body 30 is formed in the shape of an abbreviation rectangular parallelepiped, it does not restrict to this configuration.

[0058] Moreover, at this operation gestalt, it is neutral-line bar 20a. A cross section and the neutral-line bar insertion sections 1d and 2d. An opening cross section is formed in an approximate circle form, and it is grounding conductor bar 20e. A cross section and the grounding conductor bar insertion sections 1e and 2e. Although the opening cross section is formed in the approximate circle form. For example, it is neutral-line bar 20a, without enlarging a panelboard 20 so much. Grounding conductor bar 20e. When the insulating space of a between can be secured. Neutral-line bar 20a. A cross section and the neutral-line bar insertion sections 1d and 2d. Although the opening cross section is formed in an approximate circle form, it is grounding conductor bar 20e. A cross section and the grounding conductor bar insertion sections 1e and 2e. An opening cross section the configuration formed in the non-round shape. Moreover, it is grounding conductor bar 20e conversely. A cross section and the grounding conductor bar insertion sections 1e and 2e. Although the opening cross section is formed in an approximate circle form, they are the cross section of neutral-line bar 20a, and the neutral-line bar insertion sections 1d and 2d. The configuration that the opening cross section was formed in the non-round shape may be used. Then, it is neutral-line bar 20a. Or grounding conductor bar 20e. The degree of freedom and the neutral-line bar insertion sections 1d and 2d of geometric design. Or the grounding conductor bar insertion sections 1e and 2e. The degree of freedom of geometric design can be enlarged.

[0059]

[Effect of the Invention] When a thing according to claim 1 does not need to take about the neutral line and grounding conductor side lead wire in a panelboard, and has become and a grounding conductor bar inserts in the grounding conductor bar insertion section prepared in the vessel body. By preparing the grounding conductor connection terminal assembly connected to the grounding conductor bar possible [ closing motion ] while not preparing an opening between branching breakers and connecting the grounding conductor side lead wire of a load like the conventional example in a vessel body. Since it becomes unnecessary to prepare the earth terminal section independently, the dimension of a panelboard can be made small. The neutral line and the grounding conductor closing motion section of an actuation handle can open [ in addition to the effectiveness of a thing according to claim 1 ] once and close the neutral line or a grounding conductor by actuation, respectively, when measuring the insulation resistance of the load connected to a breaker and a neutral-line open/close switch, it becomes unnecessary for a thing according to claim 2 to remove grounding conductor side lead wire from the terminal assembly for grounding conductor connection, and it can improve workability.

[0060] Since a thing according to claim 3 can hold and operate the control unit which has the maximum section in which the cross section which intersects perpendicularly with the depth direction was formed greatly locally when an actuation handle is operated free [ an attitude ] in the depth direction in addition to the effectiveness of a thing according to claim 1, operability is good.

[0061] Since it connects with the neutral-line side of a load, or grounding conductor side lead wire by actuation which inserts in the neutral-line side of a load, or grounding conductor side lead wire, can \*\*\*\* the connection terminal with which the thing according to claim 4 was prepared in either [ at least ] the neutral-line connection terminal assembly or the grounding conductor connection terminal assembly in addition to the effectiveness of a thing according to claim 1 for connection, it becomes unnecessary to do a stop activity, and can raise workability.

[0062] Since what a grounding conductor bar is inserted in the neutral-line bar insertion section, and inserts a neutral-line bar in the grounding conductor bar insertion section, respectively by forming identically the area and the configuration of an opening cross section where the neutral-line bar insertion section and the insertion direction and the grounding conductor bar insertion section cross at right angles in addition to the effectiveness of a thing according to claim 1 becomes possible, a thing according to claim 5 can make high the degree of



freedom of the arrangement gestalt to a panelboard.

[0063] Since fitting of the vessel body with which a thing according to claim 6 adjoins when two or more vessel bodies are arranged in a panelboard in addition to the effectiveness of a thing according to claim 1 is mutually attained with the fitting means formed in the both sides of the direction of a short hand, what an arrangement condition becomes firm and is shaky of it is lost.

[0064] a thing according to claim 7 — the effectiveness of a thing according to claim 1 — in addition, the dimension of the direction of a short hand of the breaker which opens and closes the electrical-potential-difference line side of a load and abbreviation — by having the dimension of the same direction of a short hand, it can arrange in a panelboard so that it may correspond to a breaker and one to one, and the handling nature after arrangement can be improved.

[0065] While a thing according to claim 8 prepares an actuation handle in the end side of the longitudinal direction of a vessel body in addition to the effectiveness of a thing according to claim 1 By preparing collectively the lead-wire insertion section in which the grounding conductor side of a load and neutral-line side lead wire are inserted in the other end. The lead-wire insertion section and the actuation handle in which either [ at least ] a grounding conductor side or neutral-line side lead wire is inserted can be collectively prepared in either of the both ends, and on the whole, a vessel body can be miniaturized rather than the periphery of an actuation handle takes a big tooth space locally.

[0066] After the neutral-line side case where the neutral-line connection terminal assembly was prepared in the interior, and a grounding conductor connection terminal assembly assemble separately the grounding conductor side case prepared in the interior in addition to the effectiveness of a thing according to claim 1, a thing according to claim 9 can make the workability of an assembly high by installing along with a longitudinal direction rather than it assembles one component at a time.

[0067] In addition to the effectiveness of a thing according to claim 9, when an insulating member divides between a neutral-line side case and a grounding conductor side case, a thing according to claim 10 becomes unnecessary to prepare insulating space independently, and can miniaturize a vessel body.

[0068] Since either [ at least ] the neutral-line bar or the grounding conductor bar is formed in the cross-section approximate circle form, a thing according to claim 11 can secure the insulating space between a neutral-line bar and a grounding conductor bar, without occupancy space's being able to lessen rather than the thing of a cross-section rectangle with the equal cross section, and enlarging a panelboard.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] It is a perspective view in the condition that the neutral line and a grounding conductor bar inserted in 1 operation gestalt of this invention.

[Drawing 2] It is the front view of the panelboard with which the thing same as the above was arranged.

[Drawing 3] It is the decomposition perspective view of a neutral-line side case same as the above.

[Drawing 4] It is the decomposition perspective view of a grounding conductor side case same as the above.

[Drawing 5] It is the perspective view seen from the neutral-line side case same as the above.

[Drawing 6] It is the perspective view seen from the grounding conductor side case same as the above.

[Drawing 7] It is the top view showing actuation of the neutral-line closing motion section of an actuation handle same as the above.

[Drawing 8] It is the top view showing actuation of the grounding conductor closing motion section of an actuation handle same as the above.

[Drawing 9] It is a top view near [ same as the above ] a connection terminal.

[Drawing 10] It is the plan which compares a thing same as the above and the dimension of the direction of a short hand of a branching breaker.

[Drawing 11] It is the front view of the panelboard with which the conventional example was arranged.

[Drawing 12] It is the sectional view of a thing same as the above.

## [Description of Notations]

1 Neutral-Line Side Case

1d Neutral-line bar insertion section

1e Grounding conductor bar insertion section

2 Grounding Conductor Side Case

2d Neutral-line bar insertion section

2e Grounding conductor bar insertion section

3 Neutral-Line Connection Terminal Assembly

4 Grounding Conductor Connection Terminal Assembly

6 Connection Terminal

8 Insulating Member

9 Actuation Handle

91 Control Unit

91b The maximum section

92 Neutral-Line Closing Motion Section

93 Grounding Conductor Closing Motion Section

20a Neutral-line bar

20d Branching breaker

20e Grounding conductor bar

30 Vessel Body

30a Fitting means

30b Lead-wire insertion section

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[Translation done.]



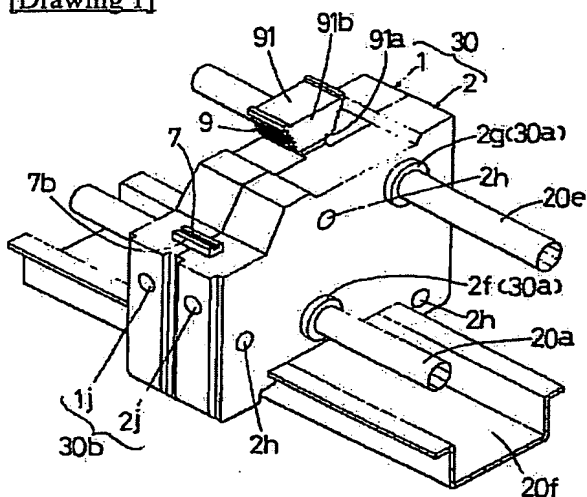
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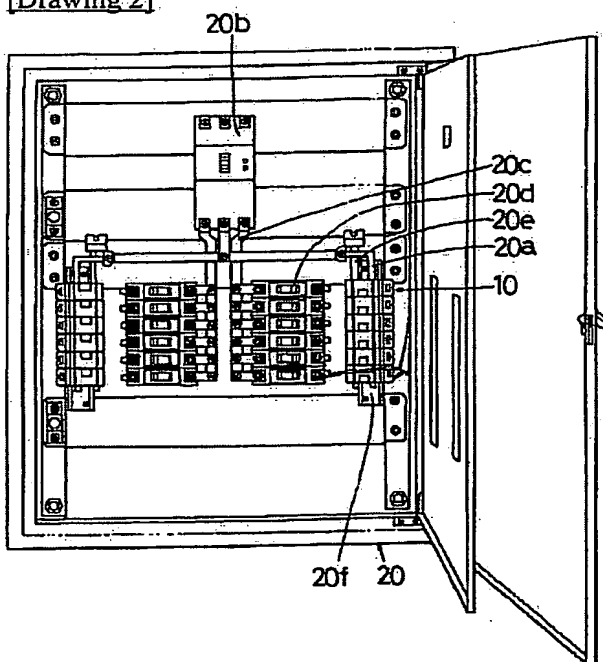
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## DRAWINGS

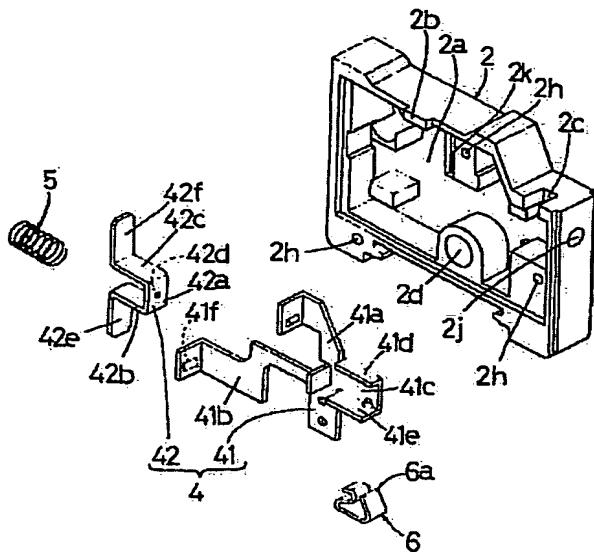
[Drawing 1]



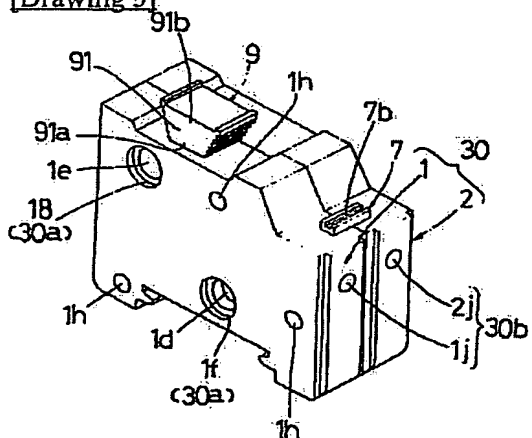
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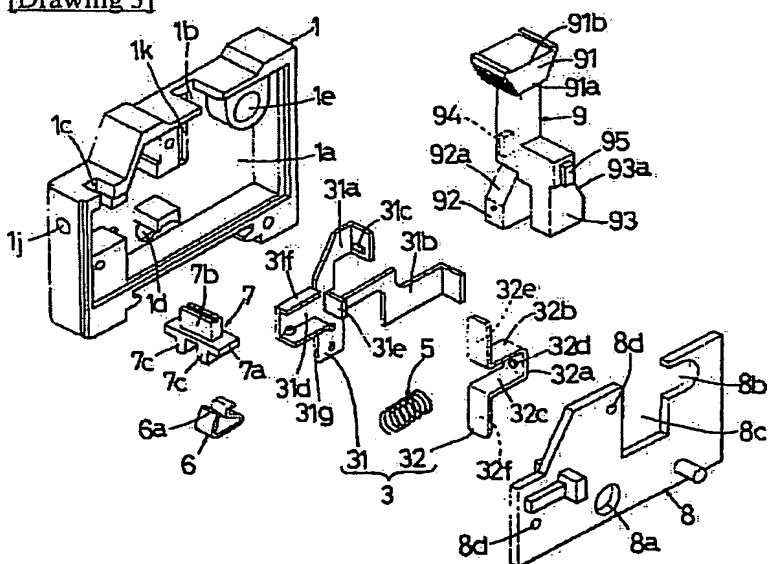
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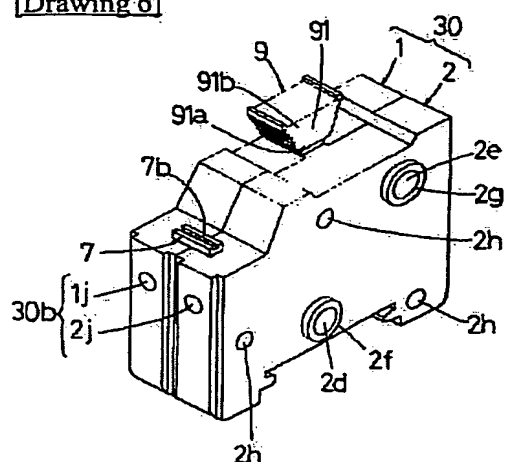
[Drawing 5]



[Drawing 3]

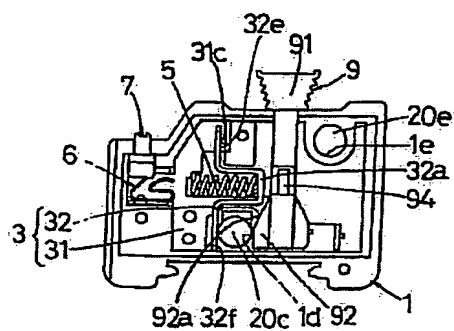


[Drawing 6]

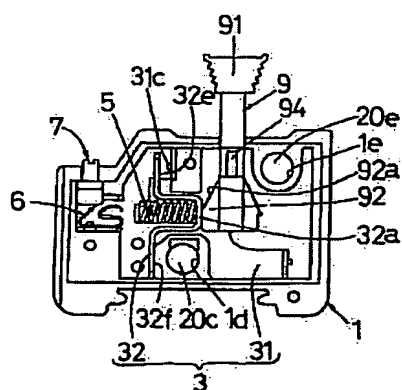


[Drawing 7]

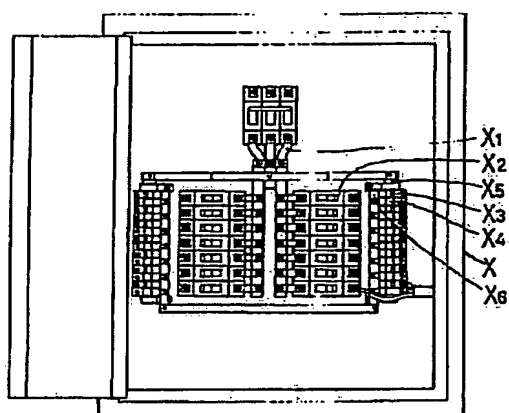
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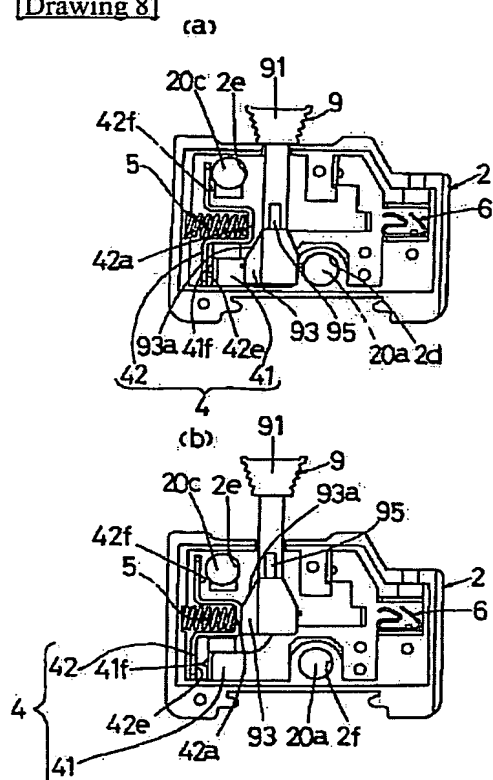
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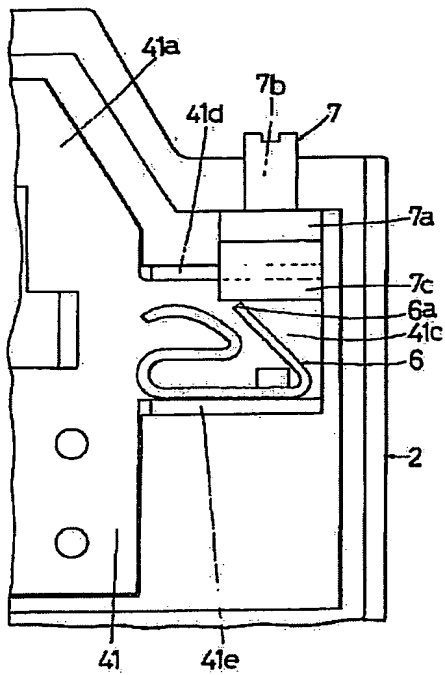
[Drawing 11]



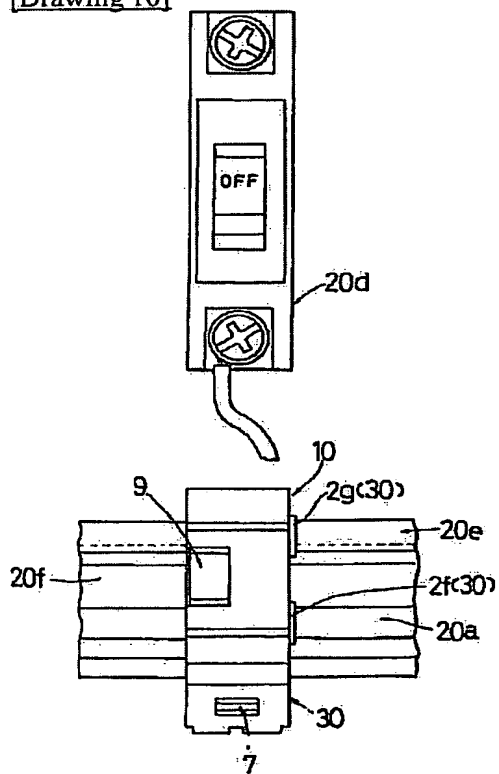
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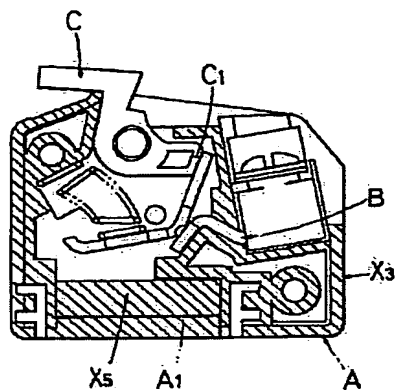
[Drawing 9]



[Drawing 10]



[Drawing 12]



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[Translation done.]

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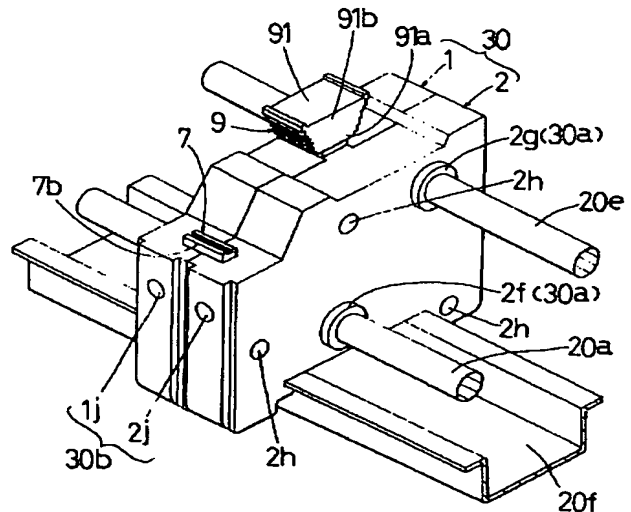
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(54) 【発明の名称】 中性線開閉スイッチ及びこれを備えた分電盤

(57) 【要約】

【課題】 中性線及び接地線側導線を分電盤内に引き回さなくてもよくするとともに、分電盤の寸法を小さくする。

【解決手段】 中性線バー20aの挿通する中性線バー挿通部が設けられた器体30と、負荷の中性線側導線に接続して器体30内に収容される中性線接続端子板と、操作されることによって中性線バー20aと中性線接続端子板との間を開閉する中性線開閉部を設けた操作ハンドル9と、を備え、中性線バー20aと負荷との間を開閉する中性線開閉スイッチにおいて、接地線バー20eの挿通する接地線バー挿通部が器体30に設けられ、負荷の接地線側導線が接続されるとともに接地線バー20eに開閉可能に接続された接地線接続端子板が器体30内に設けられた構成としている。



## 【特許請求の範囲】

【請求項1】 中性線バーの挿通する中性線バー挿通部が設けられた器体と、負荷の中性線側導線に接続して器体内に收容される中性線接続端子板と、操作されることによって中性線バーと中性線接続端子板との間を開閉する中性線開閉部を設けた操作ハンドルと、を備え、中性線バーと負荷との間を開閉する中性線開閉スイッチにおいて、接地線バーの挿通する接地線バー挿通部が前記器体に設けられ、負荷の接地線側導線が接続されるとともに接地線バーに開閉可能に接続された接地線接続端子板が前記器体内に設けられたことを特徴とする中性線開閉スイッチ。

【請求項2】 前記操作ハンドルは、操作されることによって前記接地線バーと接地線接続端子板との間を開閉する接地線開閉部が設けられたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項3】 前記操作ハンドルは、前記器体の奥行き方向に進退自在に操作されるとともに奥行き方向と直交する断面が局部的に大きく形成された極大部を有する操作部が設けられたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項4】 前記中性線接続端子板又は前記接地線接続端子板の少なくとも一方は、前記負荷の中性線側又は接地線側導線を挿通する操作によって前記負荷の中性線側又は接地線側導線と接続される接続端子が設けられたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項5】 前記中性線バー挿通部及び前記接地線バー挿通部は、挿通方向と直交する開口断面の面積及び形状が同一に形成されたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項6】 前記器体は略直方体状であって、その短手方向の両側に互いに嵌合可能な嵌合手段がそれぞれ設けられたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項7】 前記器体は略直方体状であって、その短手方向の寸法は前記負荷の電圧線側を開閉する略直方体状のブレーカの短手方向の寸法と略同一であることを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項8】 前記器体は略直方体状であって、その長手方向の一端側に前記操作ハンドルを他端側に前記負荷の接地線側及び中性線側導線が挿通される導線挿通部をそれぞれ設けたことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項9】 前記器体は略直方体状であって、前記中性線接続端子板が内部に設けられた中性線側ケース及びその中性線側ケースに長手方向に沿って並設して前記接地線接続端子板が内部に設けられた接地線側ケースを有したことを特徴とする請求項1記載の中性線開閉スイッチ。

【請求項10】 前記中性線側ケースと前記接地線側ケースとの間を仕切る絶縁部材が設けられたことを特徴とする請求項9記載の中性線開閉スイッチ。

【請求項11】 単相3線の電圧線及び中性線バーと、電圧線バーの長手方向に沿って複数個並設され電圧線バーと負荷との間を開閉するブレーカと、負荷を接地するよう中性線バーに並設された接地線バーと、請求項1記載の中性線開閉スイッチと、を備えた分電盤において、前記中性線バーの断面及び前記中性線バー挿通部の開口断面又は前記接地線バーの断面及び前記接地線バー挿通部の開口断面の少なくとも一方は、略円形に形成されたことを特徴とする分電盤。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、分電盤内に配設され電路の中性線を開閉操作する中性線開閉スイッチに関するものである。

## 【0002】

【従来の技術】本願出願人は、実開平4-128014号にて、図11に示すように、電圧線バー $X_1$ に沿って並設された複数の分岐ブレーカ $X_2$ の出力側に中性線開閉スイッチ $X_3$ 及び接地端子部 $X_4$ を並設し、それらの中性線開閉スイッチ $X_3$ 及び接地端子部 $X_4$ の幅の合計が分岐ブレーカ $X_2$ の幅以下となるようにした分電盤 $X$ を提案している。そして、この分電盤 $X$ に配設された中性線開閉スイッチ $X_3$ について詳しく述べると、このものは、図12に示すように、中性線バー $X_5$ の挿通する中性線バー挿通部 $A_1$ が設けられた器体 $A$ と、負荷の中性線側導線に接続して器体 $A$ 内に收容される中性線接続端子板 $B$ と、操作されることによって中性線バー $X_5$ と中性線接続端子板 $B$ との間を開閉する中性線開閉部 $C_1$ を設けた操作ハンドル $C$ と、を備え、中性線バー $X_5$ と負荷との間を開閉する。詳しくは、このものは、接地端子部 $X_4$ と共に、中性線バー $X_5$ と平行に接地線バー $X_6$ を隣接配置するための空隙を分岐ブレーカ $X_2$ との間に有して設けられる。

## 【0003】

【発明が解決しようとする課題】上記した中性線開閉スイッチ $X_3$ にあつては、中性線バー $X_5$ を挿通するとともに、その中性線バー $X_5$ と平行に接地線バー $X_6$ を分岐ブレーカ $X_2$ との間の配置空間に隣接配置するから、負荷の中性線及び接地線側導線を分電盤 $X$ 内に引き回さなくてもよいものとなっている。

【0004】しかしながら、このものは、別部品である接地端子部 $X_4$ と共に、接地線バー $X_6$ を隣接配置するための空隙を分岐ブレーカ $X_2$ との間に有して設けられるから、分電盤 $X$ の寸法が大きくなってしまふ。

【0005】本発明は、上記事由に鑑みてなしたもので、その目的とするところは、中性線及び接地線側導線を分電盤内に引き回さなくてもよく、また分電盤の寸法を小さくできる中性線開閉スイッチを提供することにあ



る。

【0006】

【課題を解決するための手段】上記した課題を解決するために、請求項1記載のものは、中性線バーの挿通する中性線バー挿通部が設けられた器体と、負荷の中性線側導線に接続して器体内に収容される中性線接続端子板と、操作されることによって中性線バーと中性線接続端子板との間を開閉する中性線開閉部を設けた操作ハンドルと、を備え、中性線バーと負荷との間を開閉する中性線開閉スイッチにおいて、接地線バーの挿通する接地線バー挿通部が前記器体に設けられ、負荷の接地線側導線が接続されるとともに接地線バーに開閉可能に接続された接地線接続端子板が前記器体内に設けられた構成としている。

【0007】請求項2記載のものは、請求項1記載のものにおいて、前記操作ハンドルは、操作されることによって前記接地線バーと接地線接続端子板との間を開閉する接地線開閉部が設けられた構成としている。

【0008】請求項3記載のものは、請求項1記載のものにおいて、前記操作ハンドルは、前記器体の奥行き方向に進退自在に操作されるとともに奥行き方向と直交する断面が局部的に大きく形成された極大部を有する操作部が設けられた構成としている。

【0009】請求項4記載のものは、請求項1記載のものにおいて、前記中性線接続端子板又は前記接地線接続端子板の少なくとも一方は、前記負荷の中性線側又は接地線側導線を挿通する操作によって前記負荷の中性線側又は接地線側導線と接続される接続端子が設けられた構成としている。

【0010】請求項5記載のものは、請求項1記載のものにおいて、前記中性線バー挿通部及び前記接地線バー挿通部は、挿通方向と直交する開口断面の面積及び形状が同一に形成された構成としている。

【0011】請求項6記載のものは、請求項1記載のものにおいて、前記器体は略直方体状であって、その短手方向の両側に互いに嵌合可能な嵌合手段がそれぞれ設けられた構成としている。

【0012】請求項7記載のものは、請求項1記載のものにおいて、前記器体は略直方体状であって、その短手方向の寸法は前記負荷の電圧線側を開閉する略直方体状のブレーカの短手方向の寸法と略同一である構成としている。

【0013】請求項8記載のものは、請求項1記載のものにおいて、前記器体は略直方体状であって、その長手方向の一端側に前記操作ハンドルを他端側に前記負荷の接地線側及び中性線側導線が挿通される導線挿通部をそれぞれ設けた構成としている。

【0014】請求項9記載のものは、請求項1記載のものにおいて、前記器体は略直方体状であって、前記中性線接続端子板が内部に設けられた中性線側ケース及びそ

の中性線側ケースに長手方向に沿って並設して前記接地線接続端子板が内部に設けられた接地線側ケースを有した構成としている。

【0015】請求項10記載のものは、請求項9記載のものにおいて、前記中性線側ケースと前記接地線側ケースとの間を仕切る絶縁部材が設けられた構成としている。

【0016】請求項11記載のものは、单相3線の電圧線及び中性線バーと、電圧線バーの長手方向に沿って複数個並設され電圧線バーと負荷との間を開閉するブレーカと、負荷を接地するよう中性線バーに並設された接地線バーと、請求項1記載の中性線開閉スイッチと、を備えた分電盤において、前記中性線バーの断面及び前記中性線バー挿通部の開口断面又は前記接地線バーの断面及び前記接地線バー挿通部の開口断面の少なくとも一方は、略円形に形成された構成としている。

【0017】

【発明の実施の形態】本発明の一実施形態を図1乃至図10に基づいて以下に説明する。この中性線開閉スイッチ10は、図2に示すように、分電盤20の中性線バー20aと負荷（図示せず）との間を開閉するものである。詳しくは、中性線バー20aは、断面略円形であって、分電盤20に配設された单相3線用の主幹ブレーカ20bに両電圧線バー20c、20cと共に接続されている。負荷は、電圧線バー20cの長手方向に沿って複数個並設された略直方体状の分岐ブレーカ20dによって、電圧線バー20cとの間が開閉される。また、この分電盤20には、負荷を接地する断面略円形の接地線バー20eが中性線バー20aと平行に隣接配置されている。

【0018】さらに詳しくは、この中性線開閉スイッチ10は、中性線側ケース1、接地線側ケース2、中性線接続端子板3、接地線接続端子板4、スプリング5、接続端子6、解除ボタン7、絶縁部材8、操作ハンドル9から構成されている。

【0019】中性線側ケース1は、例えばフェノール樹脂のような絶縁材料により、底板1aの周囲に側壁を有して大略一面が開いた略直方体状の箱型に形成され、接地線側ケース2と共に器体30を形成する。中性線側ケース1は、分電盤20に配設されたときに上方に位置する側壁には、長手方向の一端側に操作ハンドル用開口部1bが、他端側に解除ボタン用開口部1cが開口端面から切り欠くようにしてそれぞれ形成されている。底板1aの周囲の側壁は、均一な肉厚ではなく、内壁側は収容する部材の配置、固定、位置決め等を考慮し、外壁側は分電盤20への配設等を考慮して適宜設計する。

【0020】この中性線側ケース1の底板1aには、分電盤20の中性線バー20a及び接地線バー20eがそれぞれ挿通する中性線バー挿通部1d及び接地線バー挿通部1eが穿設されている。これらの中性線バー挿通部1d及び接地線バー挿通部1eは、いずれも開口断面が略円形であって、

挿通方向と直交する開口断面の面積及び形状が同一に形成されており、それぞれ段部1f,1g が形成されて、外方面側の開口断面が内方面側の開口断面よりも大きくなっている。また底板1aには、接地線側ケース2 固定用のかしめピン（図示せず）用の孔1hが設けられている。この中性線側ケース1 の長手方向の他端部側の側壁には、負荷の中性線側導線（図示せず）を挿通する中性線側導線挿通穴1jが穿設されている。また、この中性線側ケース1 の底板1aには、操作ハンドル9 の後述する摺動突起9aを摺動自在に支持する摺動溝1kが設けられている。

【0021】接地線側ケース2 は、中性線側ケース1 と同様に、底板2aの周囲に側壁を有して大略一面が開口した略直方体状の箱型に形成されている。接地線側ケース2 は、分電盤20に配設されたときに上方に位置する側壁には、長手方向の一端側に、中性線側ケース1 の操作ハンドル用開口部1bの切り欠き幅と略同等の幅を有した突設片2bが設けられている。この突設片2bは、接地線側ケース2 が中性線側ケース1 と共に器体30を形成したときに、操作ハンドル用開口部1bに係合して、操作ハンドル9 の挿通する挿通穴を形成する。また、接地線側ケース2 は、突設片2bが設けられた側壁の長手方向の他端側に、解除ボタン用開口部2cが開口端面から切り欠くようにして設けられている。底板2aの周囲の側壁は、中性線側ケース1の底板1aと同様に、適宜設計されて均一な肉厚ではなくなっている。

【0022】この接地線側ケース2 の底板2aには、分電盤20の中性線バー20a 及び接地線バー20e がそれぞれ挿通する中性線バー挿通部2d及び接地線バー挿通部2eが穿設されている。これらの中性線バー挿通部2d及び接地線バー挿通部2eは、いずれも開口断面が略円形であって、挿通方向と直交する開口断面の面積及び形状が同一に形成されており、外方面側の開口縁部に、中性線側ケース1 の段部1f,1g と共に互いに嵌合可能な嵌合手段30a を構成する台部2f,2g がそれぞれ形成されている。この嵌合手段30a は、後述するように、中性線側ケース1 及び接地線側ケース2 が長手方向に沿って並設して器体30が形成されたときに、その器体30の短手方向の両側に位置するようになる。また底板2aには、かしめピン（図示せず）用の孔2hが設けられている。この中性線側ケース1 の長手方向の他端部側の側壁には、負荷の接地線側導線（図示せず）を挿通する接地線側導線挿通穴2jが穿設されている。この接地線側導線挿通穴2jは、中性線側ケース1 の中性線側導線挿通穴1jと共に導線挿通部30b を構成する。この導線挿通部30b は、後述するように、中性線側ケース1 及び接地線側ケース2 が長手方向に沿って並設して器体30が形成されたときに、その器体30の長手方向の他端側に位置するようになる。また、この接地線側ケース2 の底板2aには、操作ハンドル9 の後述する摺動突起9bを摺動自在に支持する摺動溝2kが設けられている。

【0023】そして、上記した中性線側ケース1 及び接地線側ケース2 は、長手方向に沿って並設して、それぞれのかしめピン用の孔1h,2h にかしめピンを通してかしめられることにより略直方体状の器体30を構成する。この器体30の短手方向の寸法は、略直方体状の分岐ブレーカ20d の短手方向の寸法と略同一なものとなっている。

【0024】中性線接続端子板3 は、第1及び第2の接続端子板31,32 からなる。第1の接続端子板31は、導電金属材料により、一方片31a 及び他方片31b を有した略L字状に形成されている。一方片31a は、その先端部に中性線接点31c が、また略中央には他方片31b とは逆方向へ延設された接続端子配設部31d が、また基端部にはスプリング5 に当接して位置規制するスプリング規制部31e がそれぞれ設けられている。詳しくは、接続端子配設部31d は、両対向部31f,31g を有した断面略コ字型に形成されている。

【0025】第2の接続端子板32は、導電金属材料により、中央片32a 及び両対向片32b,32c を有して略コ字型に形成されている。この中央片32a は、その内方面にスプリング5 に当接して位置規制する突出形状のスプリング規制部32d が設けられている。一方対向片32b は、その先端部が他方対向片32c から遠ざかる方向へ直角に折曲されて、第1の接続端子板31の中性線接点31c に接離する中性線接点接離部32e が形成されている。他方対向片32c は、その先端部が一方対向片32b から遠ざかる方向へ直角に折曲されて、器体30内に配設された状態では、器体30の中性線バー挿通部1d,2d に挿通した中性線バー20a に接離する中性線バー接離部32fが形成されている。なお、中性線接点接離部32e の中性線接点31c との接離動作及び中性線バー接離部32f の中性線バー20a との接離動作については、詳しく後述する。

【0026】接地線接続端子板4 は、中性線接続端子板3 と同様に、第1及び第2の接続端子板41,42 からなる。第1の接続端子板41は、中性線接続端子板3 の第1の接続端子板31と同様に、一方片41a 及び他方片41b を有した略L字状に形成されている。一方片41a は、略中央に他方片41b とは逆方向へ延設された接続端子配設部41c が設けられている。詳しくは、接続端子配設部41c は、両対向部41d,41e を有した断面略コ字型に形成されている。他方片41b は、その先端部に接地線接点41f が設けられている。

【0027】第2の接続端子板42は、中性線接続端子板3 の第2の接続端子板32と同様に、中央片42a 及び両対向片42b,42c を有して略コ字型に形成されている。この中央片42a は、中性線接続端子板3 の第2の接続端子板32と同様に、その内方面にスプリング5 に当接して位置規制する突出形状のスプリング規制部42d が設けられている。一方対向片42b は、その先端部が他方対向片42c から遠ざかる方向へ直角に折曲されて、第1の接続端子板41の接地線接点41f に接離する接地線接点接離部42e

が形成されている。他方対向片42cは、その先端部が一方対向片42bから遠ざかる方向へ直角に折曲されて、器体30内に配設された状態では、器体30の接地線バー挿通部1e, 2eに挿通した接地線バー20eに接離する接地線バー接離部42fが形成されている。なお、接地線接点接離部42eの接地線接点41fとの接離動作及び接地線バー接離部42fの接地線バー20eとの接離動作については、詳しく後述する。

【0028】接続端子6は、導電金属材料により、ばね性を有して略S字状に形成され、前述したように、断面略コ字型にそれぞれ形成された中性線接続端子板3の接続端子配設部31d又は接地線接続端子板4の接続端子配設部41cに配設される。負荷の中性線側導線は、器体30の導線挿通部30bの一つを構成する中性線側導線挿通穴1jを通り、接続端子配設部31dの一方対向部31fと接続端子6の両端部との間に挿通する操作によって、接続端子6の両端部により接続端子配設部31dの一方対向部31fに押圧されるとともに抜けるのを鎖錠される。また、接地線側導線も、同様に、器体30の導線挿通部30bの一つを構成する接地線側導線挿通穴2jを通り、接続端子配設部41cの一方対向部と接続端子6の両端部との間に挿通する操作によって、接続端子6の両端部により接続端子配設部41cの一方対向部41dに押圧されるとともに、その一端部6aでもって鎖錠されることにより、抜けるのが規制される。

【0029】解除ボタン7は、基板7a、基板7aの一方面から延設された操作部7b、基板7aの他方面から延設された2個の押圧部7cからなる。この解除ボタン7は、その操作部7bが中性線側ケース1及び接地線側ケース2の解除ボタン用開口部1c, 2cに進退自在に挿通し、中性線接続端子板3の接続端子配設部31d又は接地線接続端子板4の接続端子配設部41cにそれぞれ配設された接続端子6の一端部6aを2個の押圧部7cが押圧可能な状態で装着される。接続端子6の両端部により接続端子配設部31d及び接続端子配設部41cのそれぞれの一方対向部31f, 41dに押圧されるとともに抜けるのを鎖錠された中性線側導線及び接地線側導線は、この解除ボタン7を押し込んで、接続端子6の一端部6aを押圧して鎖錠を解除することにより抜くことができる。

【0030】絶縁部材8は、中性線側ケース1と接地線側ケース2との間を仕切るものであって、絶縁性材料よりなる。この絶縁部材8は、中性線バー20aの挿通する中性線挿通穴8a、接地線バー20eが挿通する接地線バー挿通切欠8b、操作ハンドル9を配設する空間を確保するために切り欠かれた操作ハンドル用切欠8c、かしめピンの挿通する挿通穴8dがそれぞれ設けられている。

【0031】操作ハンドル9は、大略角棒状に形成され、器体の奥行き方向に進退自在に操作するための操作部91が軸方向の一端部に設けられている。詳しくは、この操作部91は、奥行き方向と直交する断面が序々に大き

くなって、断面が最も小さい極小部91aと比較して局部的に大きく形成された極大部91bを先端部に有している。この操作ハンドル9は、その他端部が二股に形成されており、配設されたときに中性線側ケース1内に位置する一方側が中性線バー20aと中性線接続端子板3との間を開閉する中性線開閉部92となっており、接地線側ケース2内に位置する他方側が接地線バー20eと接地線接続端子板4との間を開閉する接地線開閉部93となっている。これらの中性線開閉部92及び接地線開閉部93は、いずれも傾斜部92a, 93aが形成されて、一端部寄りに行くほど幅が狭くなっている。また、この操作ハンドル9は、器体30の奥行き方向に進退自在に操作される際に、中性線側ケース1の底板1a及び接地線側ケース2の底板2aのそれぞれの摺動溝1k, 2kに、摺動自在に支持される摺動突起94, 95が中央部の両側にそれぞれ設けられている。そして、この操作ハンドル9は、中性線側ケース1の操作ハンドル用開口部1b及び接地線側ケース2の突設片2bにより形成された器体30の挿通穴に挿通した状態で、器体30の長手方向の一端側に配設される。

【0032】次に、この中性線開閉スイッチ10の分電盤20における配設状態について説明する。この中性線開閉スイッチ10は、隣接したものの同士の嵌合手段30aでもって互いに嵌合した状態で、分電盤20に設けられたフレーム20f上に設置されて、図2及び図10に示すように、対応する分岐ブレーカ20dと長手方向の先端部が互いに対向する状態で配設される。

【0033】次に、図7(a)及び(b)に基づいて、操作ハンドル9の操作による中性線バー20aと第1及び第2の接続端子板31及び32からなる中性線接続端子板3との間の開閉状態について説明する。操作ハンドル9が奥行き方向に押し込まれた状態では、同図(a)に示すように、中性線バー20aと第2の接続端子板32の中性線バー接離部32fとが当接し、また第1の接続端子板31の中性線接点31cと第2の接続端子板32の中性線接点接離部32eとが当接している。そして、操作ハンドル9の操作部91を掴んで奥行き方向とは逆方向へ引っ張ると、中性線開閉部92の傾斜部92aが第2の接続端子板32の中央片32aに当接して、中央片32aをスプリング5の圧縮方向へと序々に押圧してゆくと、中性線バー20aと第2の接続端子板32の中性線バー接離部32fとが序々に開離してゆくとともに、第1の接続端子板31の中性線接点31cと第2の接続端子板32の中性線接点接離部32eとが序々に開離してゆく。そして、引っ張り操作が終了したときには、同図(b)に示すように、中性線開閉部92の幅広の先端部が第2の接続端子板32の中央片32aを押圧して、中性線バー20aと第2の接続端子板32の中性線バー接離部32fとが所定間隔を有して開離し、また第1の接続端子板31の中性線接点31cと第2の接続端子板32の中性線接点接離部32eとが所定間隔を有して開離するから、中性線バー20aと中性線接続端子板3との間が開くこととな

る。

【0034】次に、図8(a)及び(b)に基づいて、操作ハンドル9の操作による接地線バー20eと第1及び第2の接続端子板41及び42からなる接地線接続端子板4との間の開閉状態について説明する。操作ハンドル9が奥行き方向に押し込まれた状態では、同図(a)に示すように、接地線バー20eと第2の接続端子板42の接地線バー接離部42fとが当接し、また第1の接続端子板41の接地線接点41fと第2の接続端子板42の接地線接点接離部42eとが当接している。そして、操作ハンドル9の操作部91を掴んで奥行き方向とは逆方向へ引っ張ると、接地線開閉部93の傾斜部93aが第2の接続端子板42の中央片42aに当接して、中央片42aをスプリング5の圧縮方向へと徐々に押圧してゆくと、接地線バー20eと第2の接続端子板42の接地線バー接離部42fとが徐々に開離してゆくとともに、第1の接続端子板41の接地線接点41fと第2の接続端子板42の接地線接点接離部42eとが徐々に開離してゆく。そして、引っ張り操作が終了したときには、同図(b)に示すように、接地線開閉部93の幅広の先端部が第2の接続端子板42の中央片42aを押圧して、接地線バー20eと第2の接続端子板42の接地線バー接離部42fとが所定間隔を有して開離し、また第1の接続端子板41の接地線接点41fと第2の接続端子板42の接地線接点接離部42eとが所定間隔を有して開離するから、接地線バー20eと接地線接続端子板4との間が開くこととなる。この状態では、前述したように中性線バー20aと中性線接続端子板3の間が開いているから、操作ハンドル9の一度の操作で、中性線バー20aと中性線接続端子板3の間及び接地線バー20eと接地線接続端子板4との間が同時に開いたこととなる。

【0035】かかる中性線開閉スイッチ10にあっては、中性線及び接地線側導線を分電盤20内に引き回さなくてもよくなっており、器体30に設けられた接地線バー挿通部1e,2eに接地線バー20eが挿通することによって、従来例のように、ブレーカとの間に空隙を設けなくてもよくなり、また負荷の接地線側導線が接続されるとともに接地線バー20eに開閉可能に接続された接地線接続端子板4が器体30内に設けられることによって、接地端子部を別に設けなくてもよくなるから、分電盤20の寸法を小さくすることができる。

【0036】また、一度の操作により、操作ハンドル9の中性線及び接地線開閉部92,93が中性線又は接地線をそれぞれ開閉することができ、分岐ブレーカ20d及び中性線開閉スイッチ10に接続される負荷の絶縁抵抗を測定するような場合に、接地線接続用端子板4から接地線側導線を外す必要がなくなつて、作業性を向上することができる。

【0037】また、操作ハンドル9は、奥行き方向に進退自在に操作されるときに、奥行き方向と直交する断面が局部的に大きく形成された極大部91bを有する操作部

91を掴んで操作できるので、操作性が良いものとなっている。

【0038】また、中性線接続端子板3又は接地線接続端子板4にそれぞれ設けられた接続端子6は、負荷の中性線側及び接地線側導線を挿通する操作によって負荷の中性線側又は接地線側導線と接続されるから、接続のためのねじ止め作業をしなくてもよくなり、作業性を向上させることができる。

【0039】また、中性線バー挿通部1d,2d及び接地線バー挿通部1e,2eが挿通方向と直交する開口断面の面積及び形状が同一に形成されることによって、中性線バー挿通部1d,2dに接地線バー20eを、接地線バー挿通部1e,2eに中性線バー20aをそれぞれ挿通するようなことも可能となるから、分電盤20への配設形態の自由度を高くすることができる。

【0040】また、分電盤20内に配設された状態では、隣接する器体30は、その短手方向の両側に設けた嵌合手段30aによって互いに嵌合可能となるから、配設状態が強固になってぐらつくようなことがなくなる。

【0041】また、負荷の電圧線側を開閉する分岐ブレーカ20dの短手方向の寸法と略同一である短手方向の寸法を有することにより、分岐ブレーカ20dと一対一に対応するよう分電盤20内に配設することができ、配設後の取扱性を向上できる。

【0042】また、操作ハンドル9を器体30の長手方向の一端側に設けるとともに、負荷の接地線側及び中性線側導線が挿通される導線挿通部30bを他端部にまとめて設けることによって、接地線側又は中性線側導線の少なくとも一方が挿通される導線挿通部と操作ハンドル9とを両端部のいずれかにまとめて設けて操作ハンドル9の周辺部が局部的に大きなスペースを取るよりも、器体30を全体的に小型化することができる。

【0043】また、中性線接続端子板3が内部に設けられた中性線側ケース1及び接地線接続端子板4が内部に設けられた接地線側ケース2を別々に組み立てた後に、長手方向に沿って並設することによって、部品を一つずつ組み立てるよりも、組み立ての作業性を高くすることができる。

【0044】また、絶縁部材8が中性線側ケース1と接地線側ケース2との間を仕切ることによって、絶縁空間を別に設けなくてもよくなり、器体30を小型化することができる。

【0045】かかる中性線開閉スイッチ10を備えた分電盤20にあっては、中性線バー20a及び接地線バー20eは、いずれも断面略円形に形成されているから、断面積が等しい断面矩形のものよりも占有空間が少なくすることができ、分電盤20を大きくすることなく、中性線バー20aと接地線バー20eとの間の絶縁空間を確保することができる。

【0046】なお、本実施形態では、操作ハンドル9

は、操作されることによって接地線バー20e と接地線接続端子板4 との間を開閉する接地線開閉部93が設けられているが、例えば、分岐ブレーカ20d 及び中性線開閉スイッチ10に接続される負荷の絶縁抵抗をそれ程測定しないようなときは、接地線開閉部を有して操作ハンドル9 とは別々に操作されるハンドルを設け、そのハンドルの操作により接地線接続端子板4 との間を開閉するようにしてもよく、そのときは操作ハンドル9 に中性線開閉部92のみが設けられることとなるから形状がより単純となり、操作ハンドル9 の加工がよりやり易くなる。

【0047】また、本実施形態では、操作ハンドル9 は、器体30の奥行き方向に進退自在に操作されるとともに奥行き方向と直交する断面が局部的に大きく形成された極大部91b を有する操作部91が設けられているが、例えば、操作部分に滑り止め等が設けられたようなときは、奥行き方向と直交する断面の面積が均一になるように形成されてもよく、そのときは操作ハンドル9 形状がより単純となり、加工がよりやり易くなる。

【0048】また、本実施形態では、操作ハンドル9 の操作部91は、奥行き方向と直交する断面が序々に大きくなっているが、特定の部分だけ局部的に断面が大きく形成されても、同様の効果を奏することができる。

【0049】また、本実施形態では、中性線接続端子板3 及び接地線接続端子板4 は、負荷の中性線側又は接地線側導線を挿通する操作によって負荷の中性線側又は接地線側導線と接続される接続端子6 が設けられているが、例えば、器体30の大きさを小さくするために接続端子6 を配設するスペースを設けないようなときは、ねじ止め等で接続する構成にしてもよく、そのときは、中性線接続端子板3 に対向部31f, 31g を有した接続端子配設部31d を、また接地線接続端子板4 に対向部41d, 41e を有した接続端子配設部41c を設けなくてもよくなるから、中性線接続端子板3 及び接地線接続端子板4 の形状がより単純となり、加工がよりやり易くなる。

【0050】また、本実施形態では、中性線接続端子板3 及び接地線接続端子板4 は、いずれも接続端子6 が設けられているが、いずれか一方のみ接続端子6 が設けられてもよく、そのときは、接続端子6 が設けられていない接続端子板の形状がより単純となり、加工がよりやり易くなる。

【0051】また、本実施形態では、中性線バー挿通部1d, 2d 及び接地線バー挿通部1e, 2eは、挿通方向と直交する開口断面の面積及び形状が同一に形成されているが、例えば、分電盤20への配設形態が定まってい、中性線バー挿通部1d, 2d に接地線バー20e を、接地線バー挿通部1e, 2e に中性線バー20a をそれぞれ挿通するようなことがないときは、異なる面積又は形状に形成されてもよく、そのときは中性線開閉スイッチ10自体の設計の自由度を大きくすることができる。

【0052】また、本実施形態では、器体30の短手方向

の両側に互いに嵌合可能な嵌合手段30a がそれぞれ設けられているが、例えば、配設状態を強固するための治具が分電盤20に設けられているようなときは、嵌合手段30a が設けられなくてもよく、そのときは、器体30を構成する中性線側ケース1 及び接地線側ケース2 の形状がより単純になって、加工がやり易くなる。

【0053】また、本実施形態では、器体30の短手方向の寸法が分岐ブレーカ20d の短手方向の寸法と略同一であるが、例えば、分岐ブレーカ20d が大きいために、この分岐ブレーカ20d の寸法に合わせると、器体30の寸法が大きくなってしまようなときは異なる寸法でもよく、そのときは器体30の寸法設計の自由度を大きくすることができる。

【0054】また、本実施形態では、器体30の長手方向の一端側に操作ハンドル9 を他端側に負荷の接地線側及び中性線側導線が挿通される導線挿通部30b をそれぞれ設けているが、例えば、操作ハンドル9 の大きさが小さいようなときは、接地線側又は中性線側導線の少なくとも一方が挿通される導線挿通部と操作ハンドル9 とを両端部のいずれかにまとめて設けてもよく、そのときは設計の自由度を大きくすることができる。

【0055】また、本実施形態では、中性線接続端子板3 が内部に設けられた中性線側ケース1 及びその中性線側ケース1 に長手方向に沿って並設して接地線接続端子板4が内部に設けられた接地線側ケース2 を有した構成にしているが、例えば、流れ作業とした組み立てラインの工程管理のために、部品を一つずつ組み立てる方が都合が良いようなときは、このような構成にしなくてもよく、そのときは、ケース及びカバーを製作するようにしたりして、設計の自由度を大きくすることができる。

【0056】また、本実施形態では、中性線側ケース1 と接地線側ケース2 との間を仕切る絶縁部材8 が設けられているが、例えば、絶縁空間を別に設けても器体30が小さく形成されたときは、絶縁部材8 が設けられなくてもよく、そのときは部品点数を少なくすることができる。

【0057】また、本実施形態では、器体30が略直方体状に形成されているが、この形状に限るものではない。

【0058】また、本実施形態では、中性線バー20a の断面及び中性線バー挿通部1d, 2d の開口断面が略円形に形成され、接地線バー20e の断面及び接地線バー挿通部1e, 2e の開口断面が略円形に形成されているが、例えば、分電盤20をそれ程大きくすることなく、中性線バー20a と接地線バー20e との間の絶縁空間を確保できるときは、中性線バー20a の断面及び中性線バー挿通部1d, 2d の開口断面が略円形に形成されてはいるが接地線バー20e の断面及び接地線バー挿通部1e, 2e の開口断面が非円形に形成された構成でも、また逆に、接地線バー20e の断面及び接地線バー挿通部1e, 2e の開口断面が略円形に形成されてはいるが中性線バー20aの断面及び中

性線バー挿通部1d,2dの開口断面が非円形に形成された構成でもよく、そのときは、中性線バー20a又は接地線バー20eの形状設計の自由度及び中性線バー挿通部1d,2d又は接地線バー挿通部1e,2eの形状設計の自由度を大きくすることができる。

#### 【0059】

【発明の効果】請求項1記載のものは、中性線及び接地線側導線を分電盤内に引き回さなくてもよくなっており、器体に設けられた接地線バー挿通部に接地線バーが挿通することによって、従来例のように、分岐ブレーカとの間に空隙を設けなくてもよく、また負荷の接地線側導線が接続されるとともに接地線バーに開閉可能に接続された接地線接続端子板が器体内に設けられることによって、接地端子部を別に設けなくてもよくなるから、分電盤の寸法を小さくすることができる。請求項2記載のものは、請求項1記載のものの効果に加えて、一度の操作により、操作ハンドルの中性線及び接地線開閉部が中性線又は接地線をそれぞれ開閉することができ、ブレーカ及び中性線開閉スイッチに接続される負荷の絶縁抵抗を測定するような場合に、接地線接続用端子板から接地線側導線を外す必要がなくなつて、作業性を向上することができる。

【0060】請求項3記載のものは、請求項1記載のものの効果に加えて、操作ハンドルは、奥行き方向に進退自在に操作されるときに、奥行き方向と直交する断面が局部的に大きく形成された極大部を有する操作部を掴んで操作できるので、操作性が良いものとなっている。

【0061】請求項4記載のものは、請求項1記載のものの効果に加えて、中性線接続端子板又は接地線接続端子板の少なくとも一方に設けられた接続端子は、負荷の中性線側又は接地線側導線を挿通する操作によって負荷の中性線側又は接地線側導線と接続されるから、接続のためのねじ止め作業をしなくてもよくなり、作業性を向上させることができる。

【0062】請求項5記載のものは、請求項1記載のものの効果に加えて、中性線バー挿通部及び接地線バー挿通部が挿通方向と直交する開口断面の面積及び形状が同一に形成されることによって、中性線バー挿通部に接地線バーを、接地線バー挿通部に中性線バーをそれぞれ挿通するようなことも可能となるから、分電盤への配設形態の自由度を高くすることができる。

【0063】請求項6記載のものは、請求項1記載のものの効果に加えて、分電盤内に複数の器体が配設された場合に、隣接する器体は、その短手方向の両側に設けた嵌合手段によって互いに嵌合可能となるから、配設状態が強固になってぐらつくようなことがなくなる。

【0064】請求項7記載のものは、請求項1記載のものの効果に加えて、負荷の電圧線側を開閉するブレーカの短手方向の寸法と略同一である短手方向の寸法を有することにより、ブレーカと一対一に対応するよう分電盤

内に配設することができ、配設後の取扱性を向上できる。

【0065】請求項8記載のものは、請求項1記載のものの効果に加えて、操作ハンドルを器体の長手方向の一端側に設けるとともに、負荷の接地線側及び中性線側導線が挿通される導線挿通部を他端部にまとめて設けることによって、接地線側又は中性線側導線の少なくとも一方が挿通される導線挿通部と操作ハンドルとを両端部のいずれかにまとめて設けて操作ハンドルの周辺部が局部的に大きなスペースを取るよりも、器体を全体的に小型化することができる。

【0066】請求項9記載のものは、請求項1記載のものの効果に加えて、中性線接続端子板が内部に設けられた中性線側ケース及び接地線接続端子板が内部に設けられた接地線側ケースを別々に組み立てた後に、長手方向に沿って並設することによって、部品を一つずつ組み立てるよりも、組み立ての作業性を高くすることができる。

【0067】請求項10記載のものは、請求項9記載のものの効果に加えて、絶縁部材が中性線側ケースと接地線側ケースとの間を仕切ることによって、絶縁空間を別に設けなくてもよくなり、器体を小型化することができる。

【0068】請求項11記載のものは、中性線バー又は接地線バーの少なくとも一方は、断面略円形に形成されているから、断面積が等しい断面矩形のものよりも占有空間が少なくすることができ、分電盤を大きくすることなく、中性線バーと接地線バーとの間の絶縁空間を確保することができる。

#### 【図面の簡単な説明】

【図1】本発明の一実施形態に中性線及び接地線バーが挿通した状態の斜視図である。

【図2】同上ものが配設された分電盤の正面図である。

【図3】同上の中性線側ケースの分解斜視図である。

【図4】同上の接地線側ケースの分解斜視図である。

【図5】同上の中性線側ケースから見た斜視図である。

【図6】同上の接地線側ケースから見た斜視図である。

【図7】同上の操作ハンドルの中性線開閉部の動作を示す平面図である。

【図8】同上の操作ハンドルの接地線開閉部の動作を示す平面図である。

【図9】同上の接続端子付近の平面図である。

【図10】同上のものと及び分岐ブレーカの短手方向の寸法を比較する上面図である。

【図11】従来例が配設された分電盤の正面図である。

【図12】同上のものの断面図である。

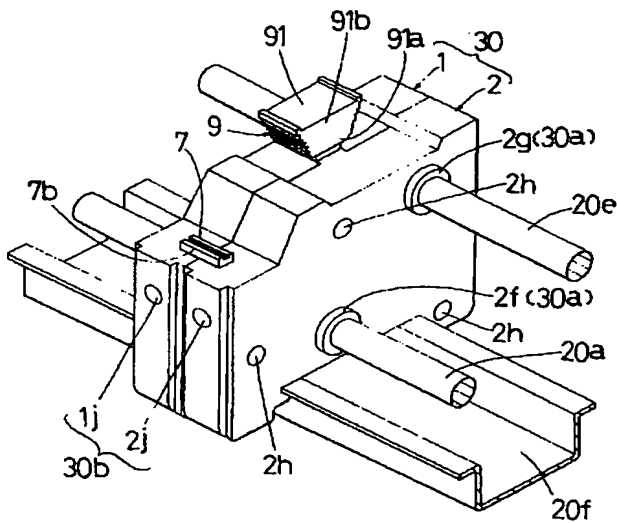
#### 【符号の説明】

- 1 中性線側ケース
- 1d 中性線バー挿通部
- 1e 接地線バー挿通部

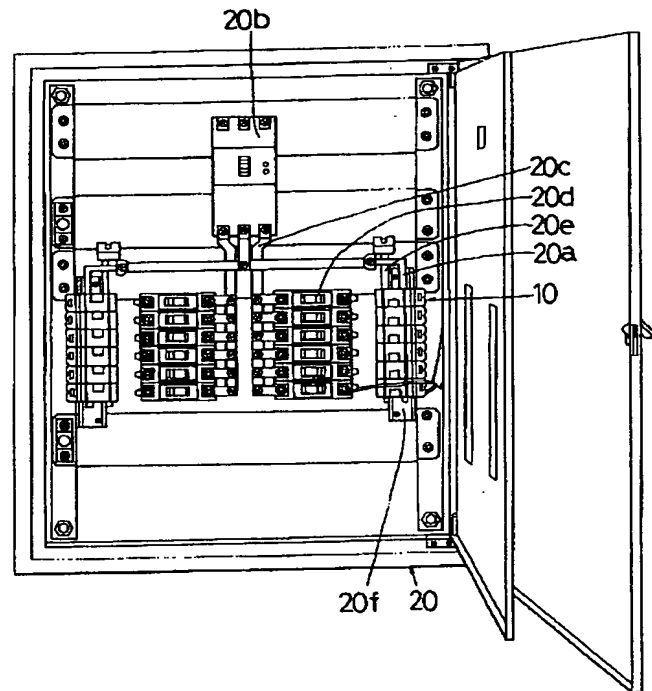
- 2 接地線側ケース
- 2d 中性線バー挿通部
- 2e 接地線バー挿通部
- 3 中性線接続端子板
- 4 接地線接続端子板
- 6 接続端子
- 8 絶縁部材
- 9 操作ハンドル
- 91 操作部

- 91b 極大部
- 92 中性線開閉部
- 93 接地線開閉部
- 20a 中性線バー
- 20d 分岐ブレーカ
- 20e 接地線バー
- 30 器体
- 30a 嵌合手段
- 30b 導線挿通部

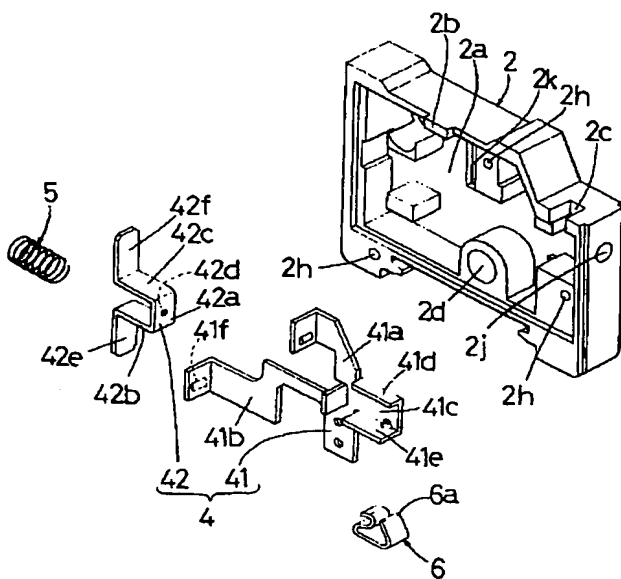
【図1】



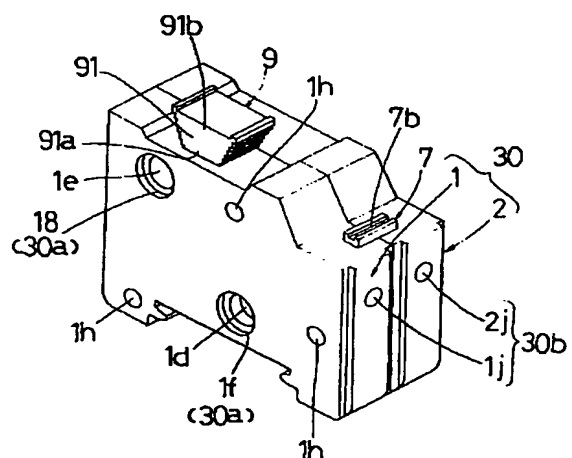
【図2】



【図4】



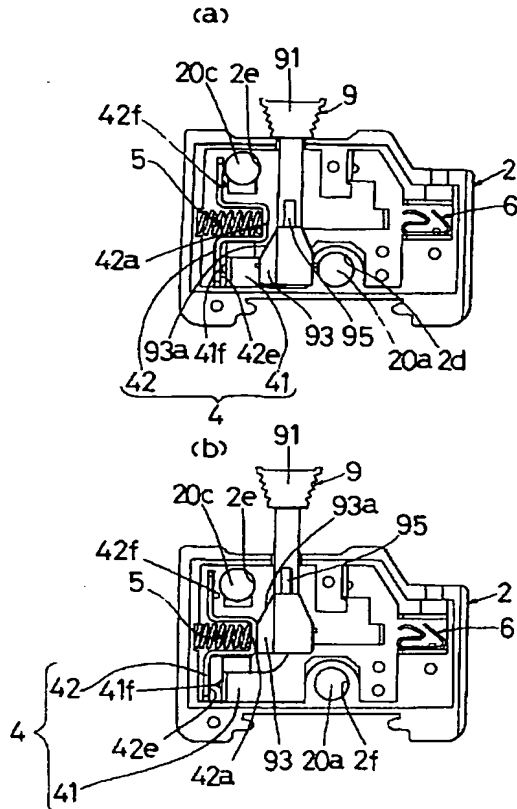
【図5】



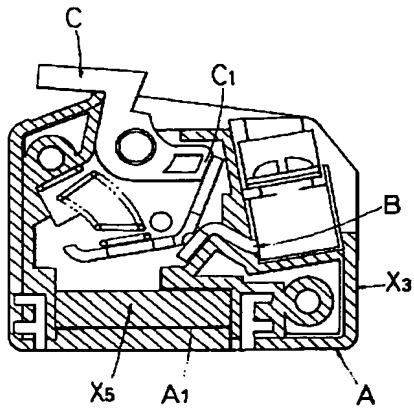




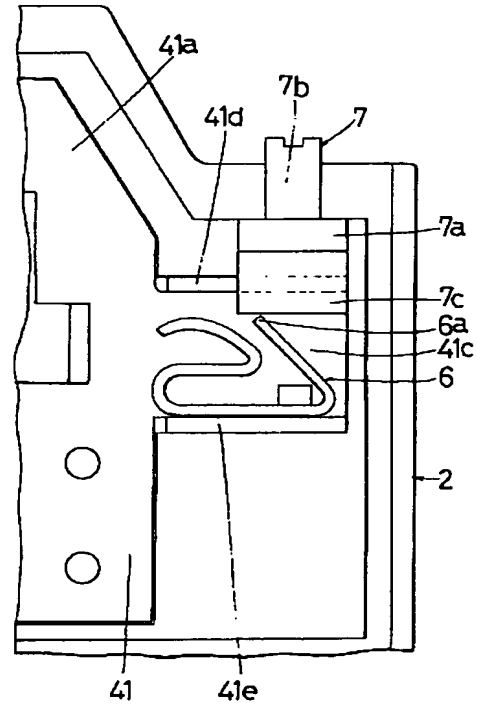
【図8】



【図12】



【図9】



【図10】

